LLOYD'S REGISTER OF SHIPPING

No. 71, Fenchurch Street, E.C.3.

LONDON

GEOMETRIC PROPERTIES OF ROLLED SECTIONS AND BUILT GIRDERS

VOL. 3.

ON LOAN FROM
RDD REFERENCE
LIBRARY

REGISTER BOOKS AND OTHER PUBLICATIONS ISSUED BY THE COMMITTEE OF LLOYD'S REGISTER OF SHIPPING

LLOYD'S REGISTER BOOK (The Register of ships and List of Shipowners are issued annually in July and August respectively; the Appendix in January).

The Register of Ships (in two volumes A–L and M–Z) contains the names, classes and general information concerning the ships classed by Lloyd's Register of Shipping (including the British Corporation Register); also particulars of all known ocean-going merchant ships in the world, of 100 tons gross and upwards.

The second volume (M–Z) also contains floating docks, liquefied gas carriers, ships carrying refrigerated cargo, refrigerated cargo containers, refrigerated stores classed with Lloyd's Register and off-shore drilling rigs, as well as lists of changes of ships' names and compound names.

The Register is kept up to date by means of cumulative monthly Supplements containing the latest survey records for all classed ships, and changes of name, ownership, flag, tonnage, &c., for all ships, whether classed or not. Each Supplement is accompanied by particulars of new entries to the Register—that is, new ships and ships of which the names have been changed.

A Weekly List of Alterations in the Register of Ships is also published.

List of Shipowners contains a list of owners and managers of the ships recorded in the Register with their fleets.

The Appendix contains lists of shipbuilders with existing ships they have built; marine enginebuilders and boilermakers; dry and wet docks; telegraphic addresses and codes used by shipping firms; marine insurance companies.

Statistical Tables are issued gratis to Subscribers to the Register Book.

REGISTER OF YACHTS Published annually in April, this volume contains in addition to detailed information relating to yachts classed by the Society, the names, dimensions, etc., of other British and overseas yachts, whose particulars are known; a list of one-design and restricted classes; national authorities and list of sail numbers of certain classes of racing yachts*; geographical list of yacht clubs; list and particulars of yacht and sailing clubs with the names of officers; index of signal letters; late names of yachts; names and addresses of yacht builders and designers; list of owners with their addresses, clubs and the names of their yachts.

***LIST OF NATIONAL AUTHORITIES AND SAIL NUMBERS OF RACING YACHTS** (as published in the Register of Yachts) may be purchased separately.

THE FLAG BOOKLET (published in 1966). A comprehensive record, in full colour, of yacht club burgees and defaced ensigns as well as the distinguishing flags of yachtsmen.

YACHT RULES

- Vol. I:—WOOD AND COMPOSITE YACHTS (Sailing, Auxiliary, and Full Power)
- Vol. II:—STEEL YACHTS
- Vol. III:—INTERNATIONAL RATING CLASSES
- PROVISIONAL RULES FOR THE CONSTRUCTION OF REINFORCED PLASTIC YACHTS
- A GUIDE TO MACHINERY AND ELECTRICAL EQUIPMENT IN YACHTS

REGISTER OF AMERICAN YACHTS

This Register is published annually in May from the Society's New York Office. Copies may also be obtained on application to the Manager, Lloyd's Register Printing House, Manor Royal, Crawley, Sussex, England.

This book contains the names, dimensions, and full particulars of the yachts of the United States and Canada, so far as they are ascertainable; reproductions in colour of the burgees of yacht clubs and the private signals of yachtsmen; a list of yacht clubs with the names of their officers; an index of signal letters; late names of yachts; and a list of yacht owners of the United States and Canada, with their addresses, clubs and yachts.

Also issued separately:—

Club Burgees and Private Signals (in colour)

RULES AND REGULATIONS FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS, which contain the following:—

Chapter	
	REGULATIONS
A	General Rules and Regulations of Lloyd's Register of Shipping.
B	Classification Regulations.
C	Periodical Survey Regulations.
	CONSTRUCTION RULES
D	Steel Ships.
E	Pumping and Piping.
F	Fire Protection, Detection and Extinction.
G	Conditions for Survey of Machinery during Construction.
H	Main and Auxiliary Engines and Associated Machinery Components.
J	Boilers and other Pressure Vessels.
K	Spare Gear for Steam and Oil Engine Machinery Installations.
L	Control Engineering Equipment.
M	Electrical Equipment and Electric Propelling Machinery.
N	Refrigerated Cargo Installations.
P	Materials for Ship Construction.
Q	Materials for Boiler, Pressure Vessel and Machinery Construction.
	Appendices giving lists of Approved Manufacturers of Materials and Proving Establishments.
R	Provisional Rules and Guidance Notes:

- (A) Methane Gas as fuel for the propulsion of Methane Tankers.
- (B) Plastic Pipes.
- (C) Classification of Nuclear Ships.
- (D) Metal Pipes for Water Services.
- (E) Torsional Vibration Characteristics of Main and Auxiliary Oil Engines.
- (F) Classification of Floating Docks.
- (G) Propeller—Hull Clearances.
- (H) Repairs by Welding to Steel Castings for Crankshafts.

EXTRACTS FROM THE RULES:—

	CHAPTER(S)
No. 1	B and C
No. 2	B, C, D and P (including Appendices)
No. 3	B, C, E, F, G, H, J, K, Q (including Appendices) and R (A, B, D, E, G and H)
No. 4	E, G, H, K, Q (including Appendices) and R (A, B, D, E, G and H)
No. 5	J, Q (including Appendices) and R (A and H)
No. 6	F
No. 7	M
No. 8	N (and Frozen Meat Stores)
No. 9	P, Q (including Appendices) and R (H)

RULES FOR STEEL TRAWLERS

GEOMETRIC PROPERTIES OF ROLLED SECTIONS AND BUILT GIRDERS

Volume I British and U.S.A. Sections Volume II Metric Sections Volume III Japanese Sections

A series of curves giving section modulus and moment of inertia of a wide range of sections used in shipbuilding, in association with varying thicknesses of plating. The areas of sections (without plating) are also given.

ANCHORS—APPROVED DESIGNS

Comprising lists (1) in alphabetical order of Firms, (2) in alphabetical order of name (if any) of anchors, together with descriptive sketches. Revised and brought up to date, 1945.

FREIGHT CONTAINER CERTIFICATION SCHEME

PROVISIONAL REQUIREMENTS FOR THE SURVEY OF PRESSURE COMPONENTS FOR LAND-BASED NUCLEAR INSTALLATIONS

APPROVED ELECTRODES FOR WELDING IN HULL CONSTRUCTION

LIST OF APPROVED FUSES

LIST OF TYPE TESTED CIRCUIT-BREAKERS

CARGO HANDLING GEAR CODE

PROVISIONAL RULES FOR THE APPLICATION OF GLASS REINFORCED PLASTICS TO FISHING CRAFT

AUTOMATIC CONTROLS IN SHIPS

GUIDANCE NOTES AND REQUIREMENTS FOR THE CLASSIFICATION OF AIR CUSHION VEHICLES

TERMS OF SUBSCRIPTION FOR THE REGISTER BOOKS AND PRICES OF OTHER PUBLICATIONS UPON APPLICATION TO THE MANAGER, LLOYD'S REGISTER PRINTING HOUSE, MANOR ROYAL, CRAWLEY, SUSSEX, ENGLAND.

ON LOAN FROM
RDD REFERENCE
LIBRARY

LLOYD'S REGISTER OF SHIPPING

FOUNDED 1760

GEOMETRIC PROPERTIES
OF
ROLLED SECTIONS AND BUILT GIRDERS

Volume III

JAPANESE SECTIONS

71, FENCHURCH STREET, LONDON, E.C.3

3 A*

© 1960. Lloyd's Register of Shipping

71, Fenchurch Street. London E.C.3, England

Printed by Lloyd's Register of Shipping
at Garrett House, Manor Royal
Crawley, Sussex, England

Reprinted 1968

PREFACE

This book has been prepared for the use of shipbuilders and designers in selecting the appropriate sections for longitudinals, frames and other stiffening members as required by the Society's revised Rules for Oil Tankers. The section modulus given by the formulæ in these Rules is that of the stiffener in association with 610 mm. of plating having the same thickness as the associated shell, deck or bulkhead plating, and curves have therefore been prepared giving the section modulus of sections in association with varying thicknesses of plating.

An endeavour has been made to include all rolled sections used in shipbuilding and it is intended to issue supplementary sheets when new sections are introduced. Suggestions from users of the book for the inclusion of additional sections will be welcome.

The areas of the sections (without plating) have been included so as to facilitate the selection of the most economic section.

Curves giving the moment of inertia in association with plating of varying thickness have also been included.

A set of curves is provided for determining the section modulus of built girders; these curves are also applicable to built or flat bar longitudinals.

June, 1960

Extract from "Rules and Regulations for the Construction and Classification of Steel Ships"

Chapter D

OIL TANKERS

Section 53

EFFECTIVE SECTION MODULUS, FACE AREAS AND MINIMUM THICKNESSES

EFFECTIVE SECTION MODULUS

Longitudinals, Frames and Stiffeners

5301 For longitudinals, side frames and bulkhead stiffeners the section modulus required by the appropriate formula is to be that of the section in association with 610 mm. of plating having the same thickness as the shell, deck or bulkhead plating as appropriate. Where the attached plating is of varying thickness, the mean thickness over the appropriate span is to be used.

The effective section moduli of rolled sections and the area of the section without plating are given in the publication "Geometric Properties of Rolled Sections and Built Girders".

The effective section moduli of flat bars or built sections may be obtained from curves in the above publication.

Transverses, Webs, Stringers and Girders

5302 For transverses, webs, stringers and girders, the section modulus required by the appropriate formula is to be that of the member in association with an effective area of shell, deck or bulkhead plating.

5303 Except for corrugated bulkheads, the effective area is to be:—

$$A = 10\,k\,b\,t_p \text{ square cm.,}$$

where k = a coefficient obtained from the table below,

b = actual width in metres of load-bearing plating, i.e., one half the sum of spacings of parallel adjacent members of greater or equivalent length (*see* sketches on pages ii and iii),

t_p = mean thickness of attached shell, deck or bulkhead plating in mm.,

l = overall length of girder, transverse, etc., in metres (*see* sketches on pages ii and iii).

$\frac{l}{b}$	0,5	1,0	2,0	3,0	4,0	5,0	6,0
k	0,12	0,23	0,45	0,67	0,80	0,90	1,00

For intermediate values of $\frac{l}{b}$, k is to be obtained by interpolation. Where $\frac{l}{b}$ exceeds 6,0, k is to be taken as 1,0.

5304 For corrugated bulkheads the effective area is to be:—

(a) for girders, etc., at right angles to the direction of corrugations:

A = area of face plate in square cm. (*see also* 5307).

(b) for girders, etc., parallel to the direction of corrugations:

$$A = \frac{b_c\,t_p}{100} \text{ square cm.,}$$

where b_c = breadth in mm. of flat panel of corrugated bulkhead,

t_p = thickness of bulkhead plating in mm. Where the bulkhead thickness varies, the mean thickness over the appropriate span is to be used.

5305 The effective section modulus of any transverse, web, stringer or girder is given by the formula:—

$$\frac{I}{y} = \frac{ad}{10} + \frac{t_w d^2}{6000}\left[1 + \frac{200\,(A - a)}{200\,A + t_w\,d}\right] \text{cm.}^3$$

where a = area of face plate in square cm.,

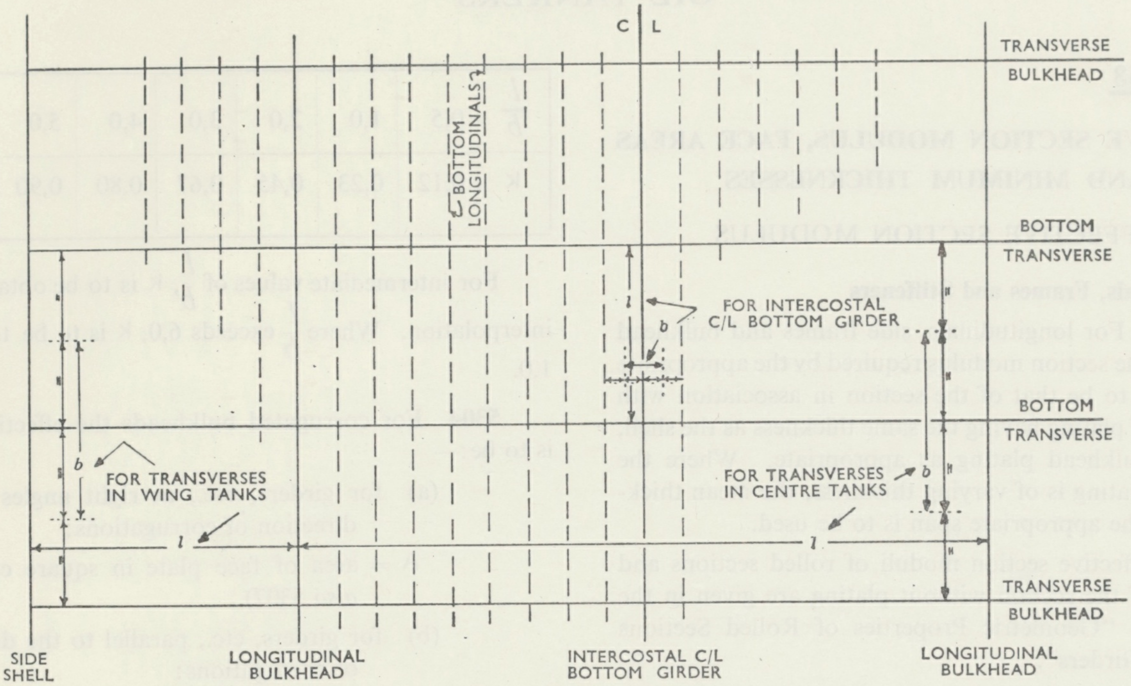
d = depth of girder, etc., between inside of face plate and attached plating, in mm. Where the girder, etc., is at right angles to the line of corrugations the minimum depth is to be taken,

t_w = thickness of web in mm.,

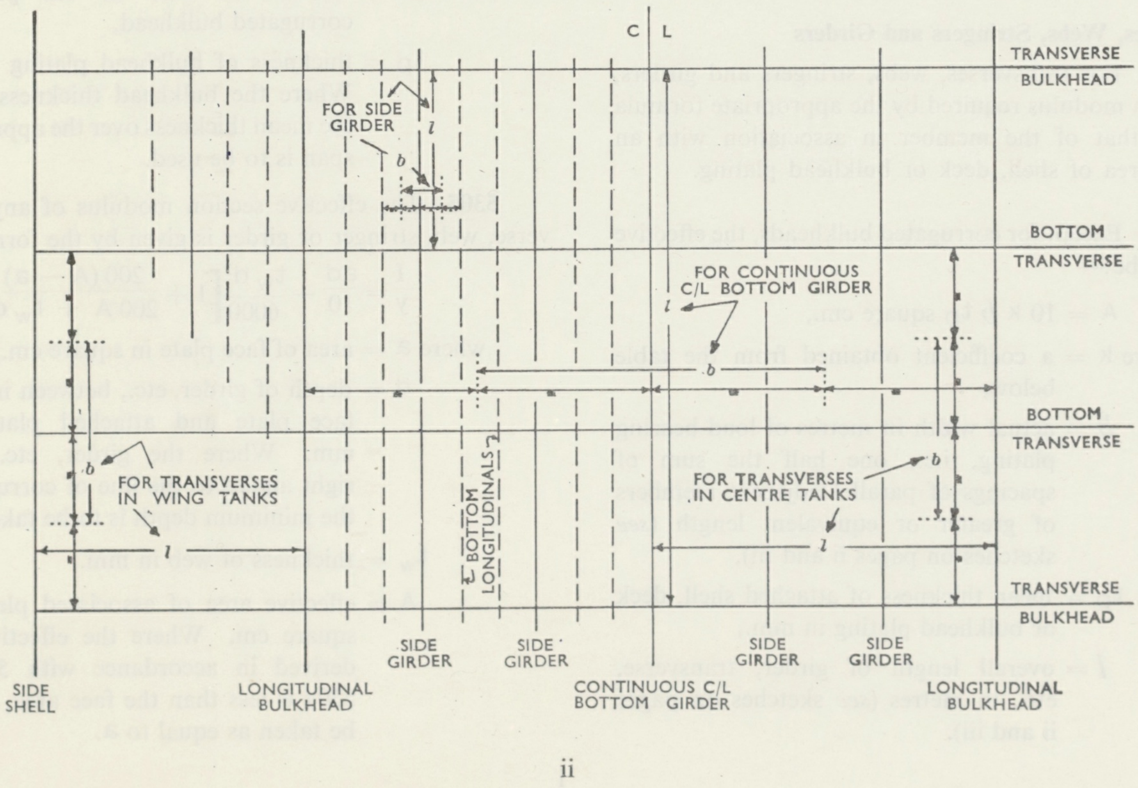
A = effective area of associated plating in square cm. Where the effective area derived in accordance with 5303 or 5304 is less than the face area, A is to be taken as equal to a.

TO ILLUSTRATE PARAGRAPH D 5303

(a) BOTTOM STRUCTURE WITH INTERCOSTAL BOTTOM CENTRE-LINE GIRDER

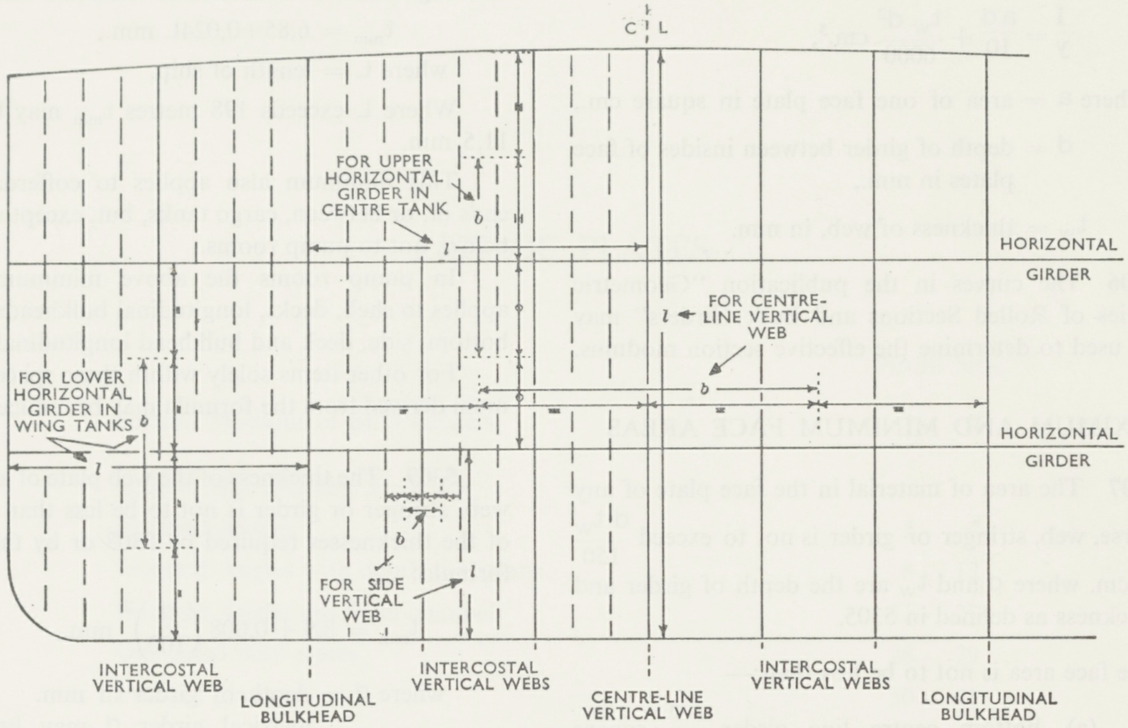


(b) BOTTOM STRUCTURE WITH CONTINUOUS BOTTOM CENTRE-LINE GIRDER

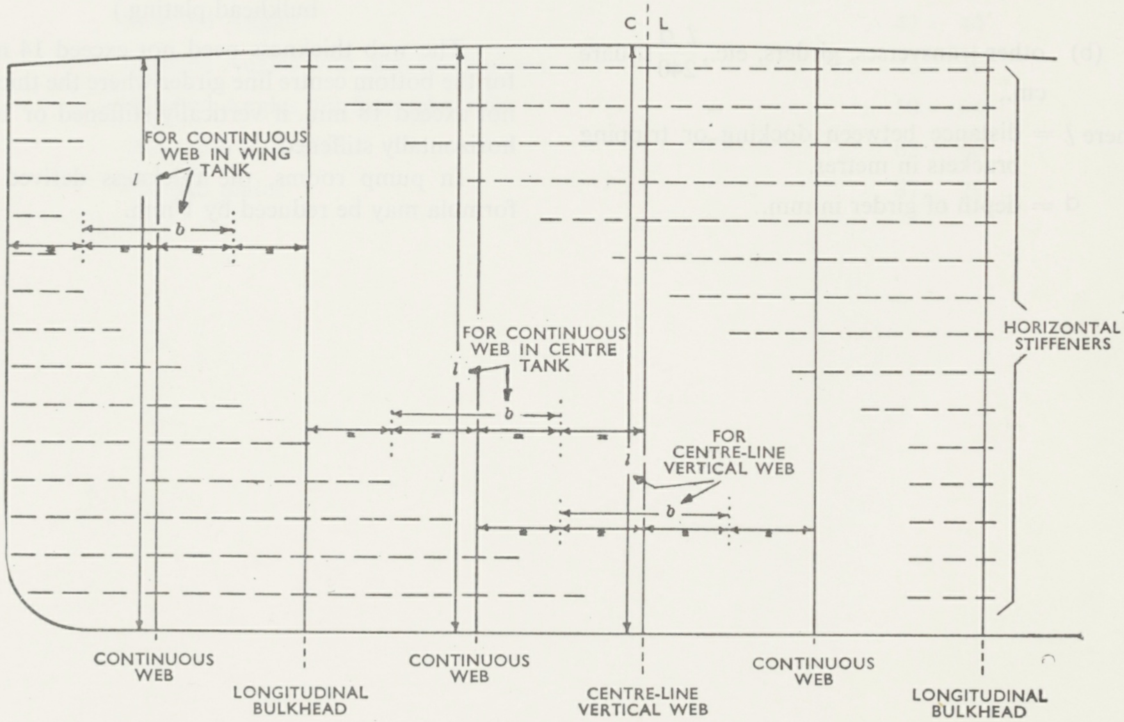


TO ILLUSTRATE PARAGRAPH D 5303

(c) TRANSVERSE BULKHEAD WITH VERTICAL STIFFENING



(d) TRANSVERSE BULKHEAD WITH HORIZONTAL STIFFENING



For girders, etc., which are symmetrical on each side of the bulkhead the attached plating is to be ignored and the effective section modulus is given by:—

$$\frac{I}{y} = \frac{a\,d}{10} + \frac{t_w\,d^2}{6000}\ \text{cm.}^3,$$

where a = area of one face plate in square cm.,

d = depth of girder between insides of face plates in mm.,

t_w = thickness of web, in mm.

5306 The curves in the publication "Geometric Properties of Rolled Sections and Built Girders" may also be used to determine the effective section modulus.

MAXIMUM AND MINIMUM FACE AREAS

5307 The area of material in the face plate of any transverse, web, stringer or girder is not to exceed $\frac{d\,t_w}{150}$ square cm. where d and t_w are the depth of girder and web thickness as defined in 5305.

The face area is not to be less than:—

(a) bottom centre line girder $\frac{l\,d}{60}$ square cm.,

(b) other transverses, girders, etc., $\frac{l\,d}{240}$ square cm.,

where l = distance between docking or tripping brackets in metres,

d = depth of girder in mm.

MINIMUM THICKNESS

5308 No part of the structure within the range of the cargo tanks is to be less in thickness than:

$$t_{min} = 6{,}85 + 0{,}024L\ \text{mm.},$$

where L = length of ship.

Where L exceeds 198 metres t_{min} may be taken as 11,5 mm.

This minimum also applies to cofferdams at the ends of, or between, cargo tanks, but, except as indicated below, not to pump rooms.

In pump rooms the above minimum thickness applies to shell, decks, longitudinal bulkheads and to the bottom, side, deck and bulkhead longitudinals.

For other items solely within these spaces the minimum derived from the formula may be reduced by 1 mm.

5309 The thickness of the web plate of a transverse, web, stringer or girder is not to be less than the greater of the thicknesses required by 5308 or by the following formula:

$$t_{min} = 8{,}9 + 0{,}008\left(\frac{d}{100}\right)^2\ \text{mm.},$$

where d = depth of girder in mm. (In a symmetrical girder d may be measured between inside of face plate and the bulkhead plating.)

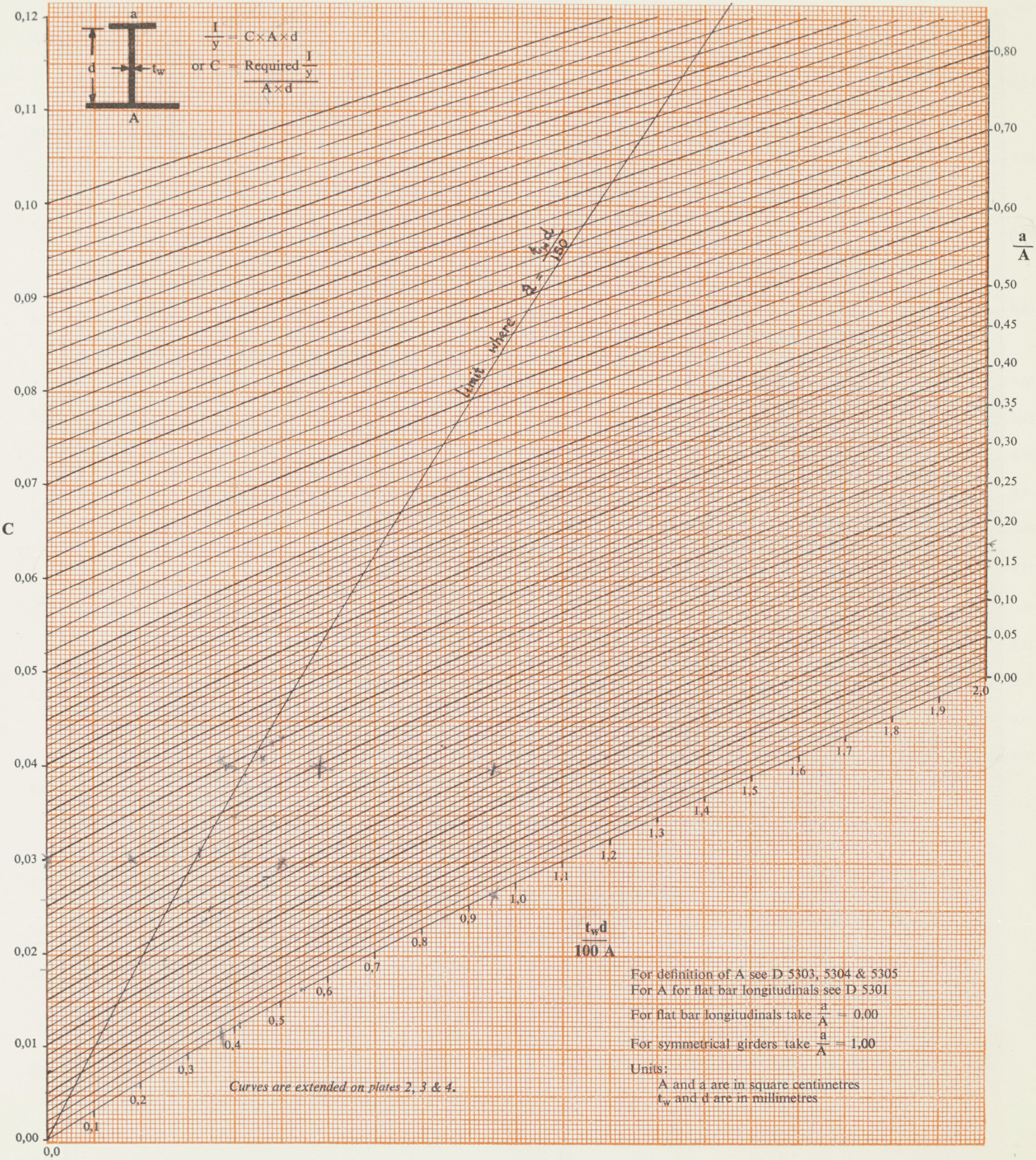
The web thickness need not exceed 14 mm. except for the bottom centre line girder where the thickness need not exceed 18 mm. if vertically stiffened or 16,5 mm. if horizontally stiffened.

In pump rooms, the thickness derived from this formula may be reduced by 1 mm.

LIST OF PLATES

SECTION MODULUS OF BUILT GIRDERS

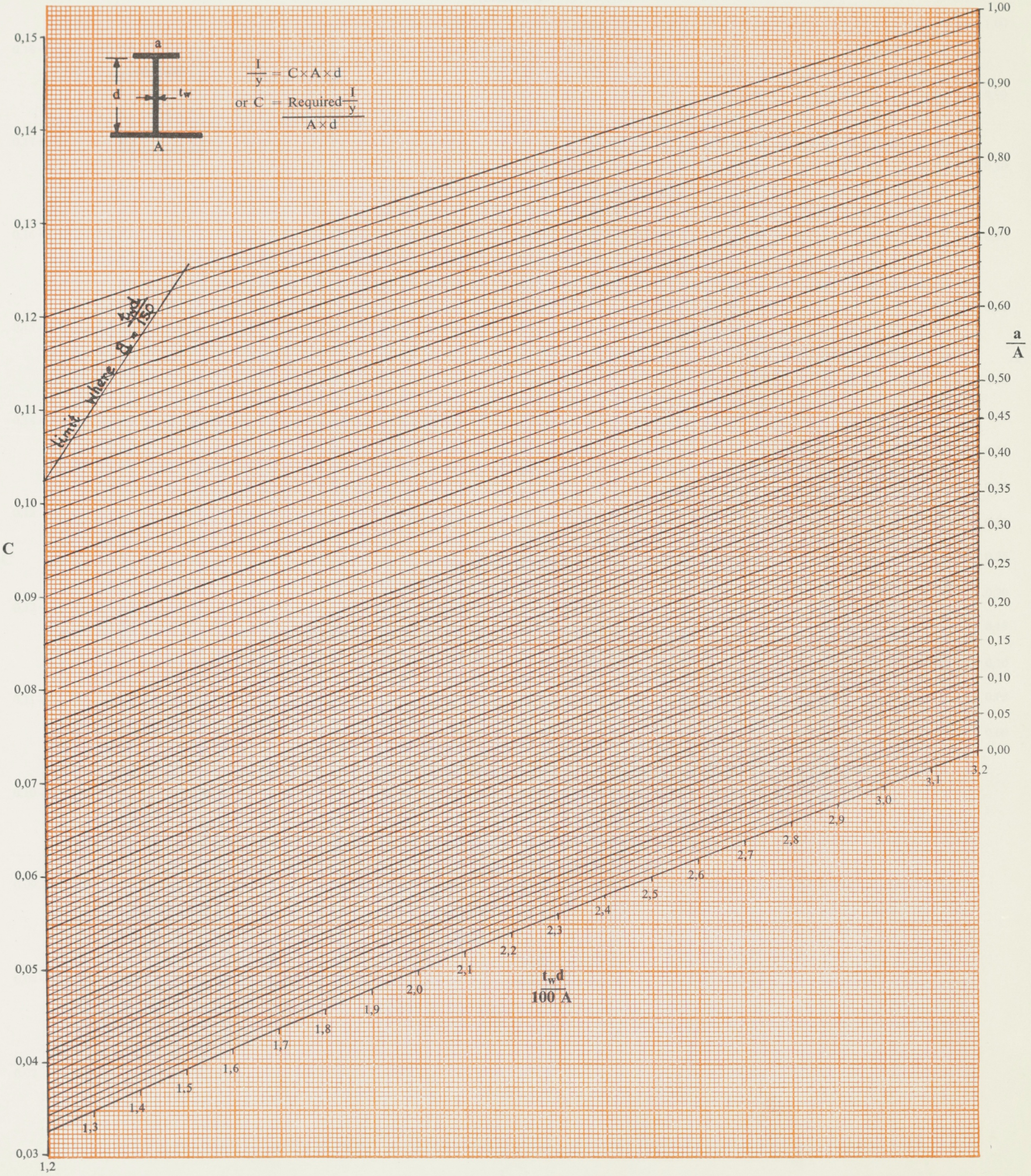
(IN ASSOCIATION WITH PLATING)



SECTION MODULUS OF BUILT GIRDERS

(IN ASSOCIATION WITH PLATING)

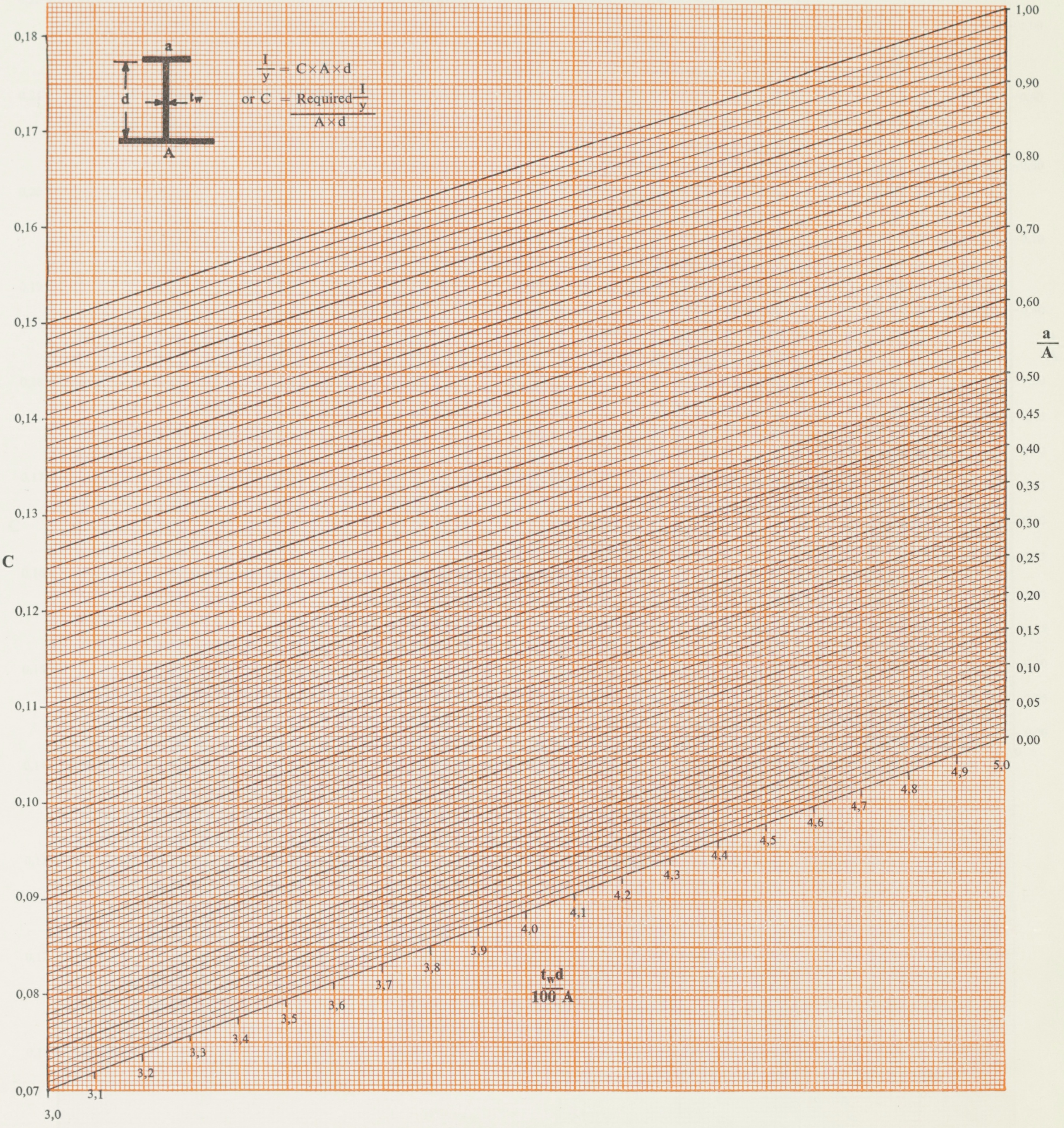
(*Continued*)



SECTION MODULUS OF BUILT GIRDERS

(IN ASSOCIATION WITH PLATING)

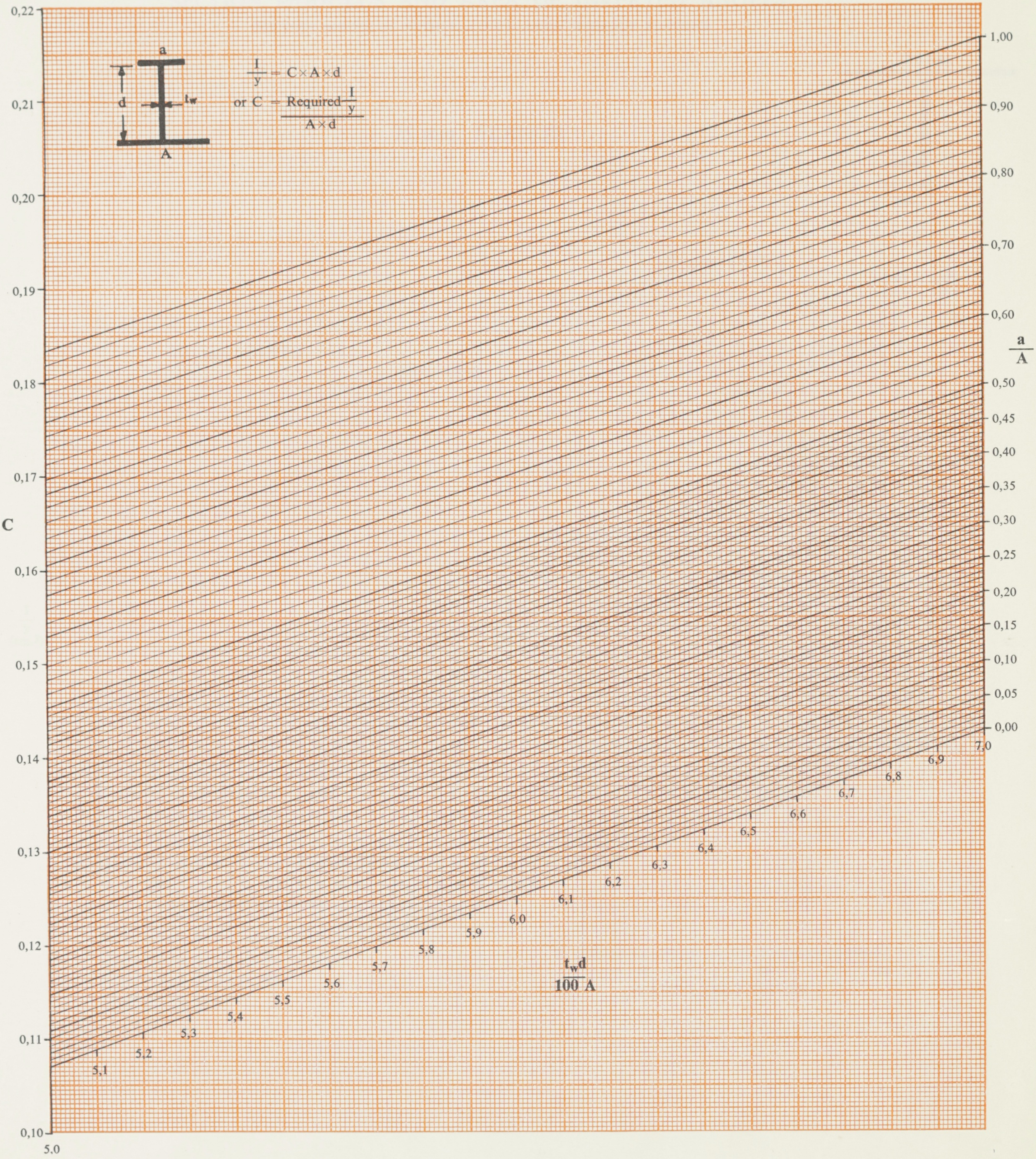
(*Continued*)



SECTION MODULUS OF BUILT GIRDERS

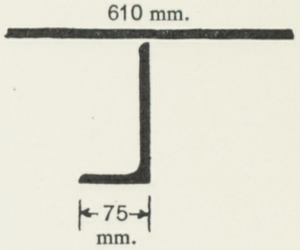
(IN ASSOCIATION WITH PLATING)

(*Continued*)

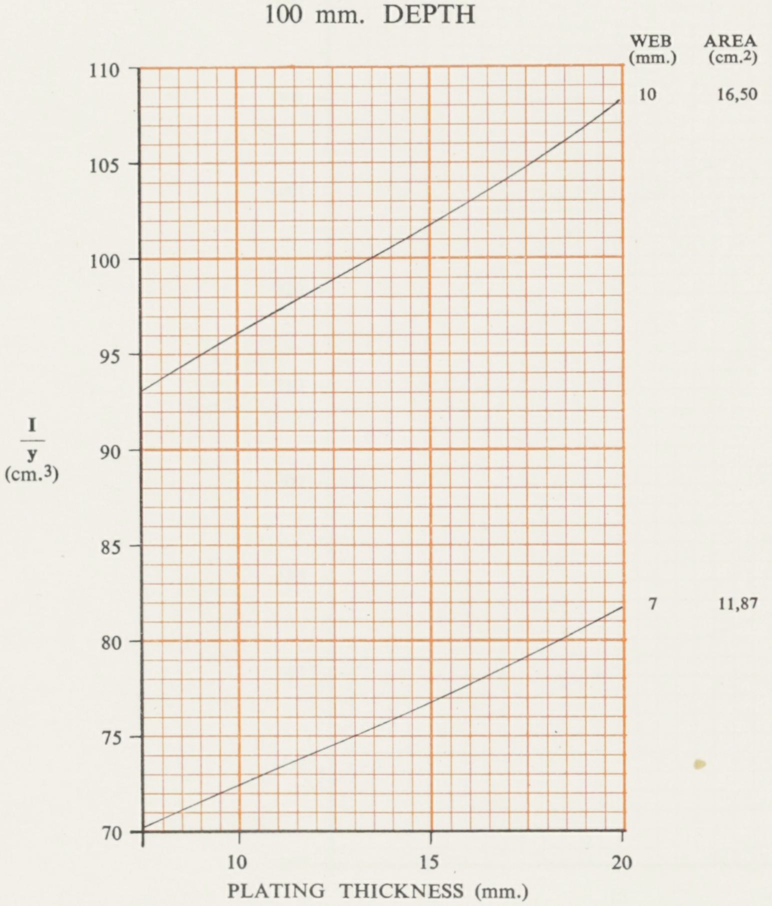


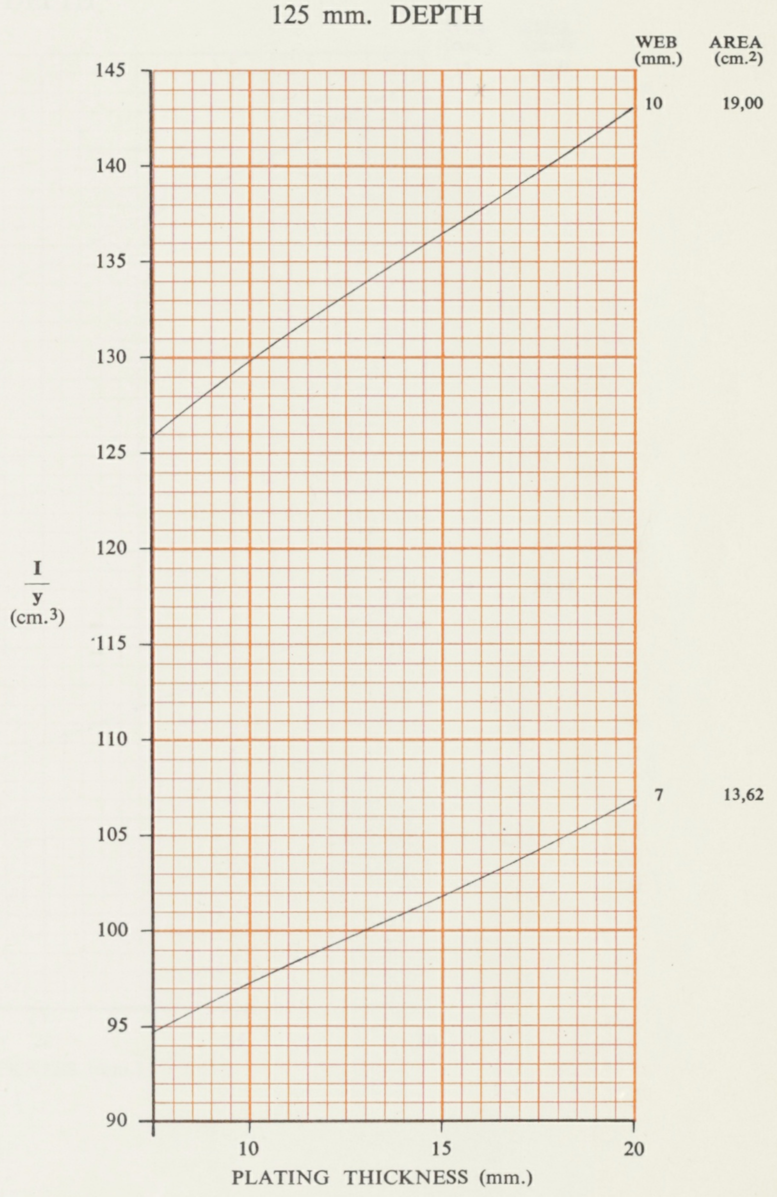
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



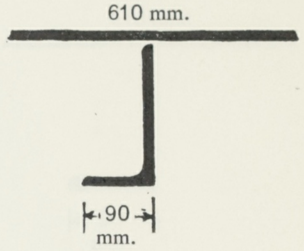
75 mm. FLANGE





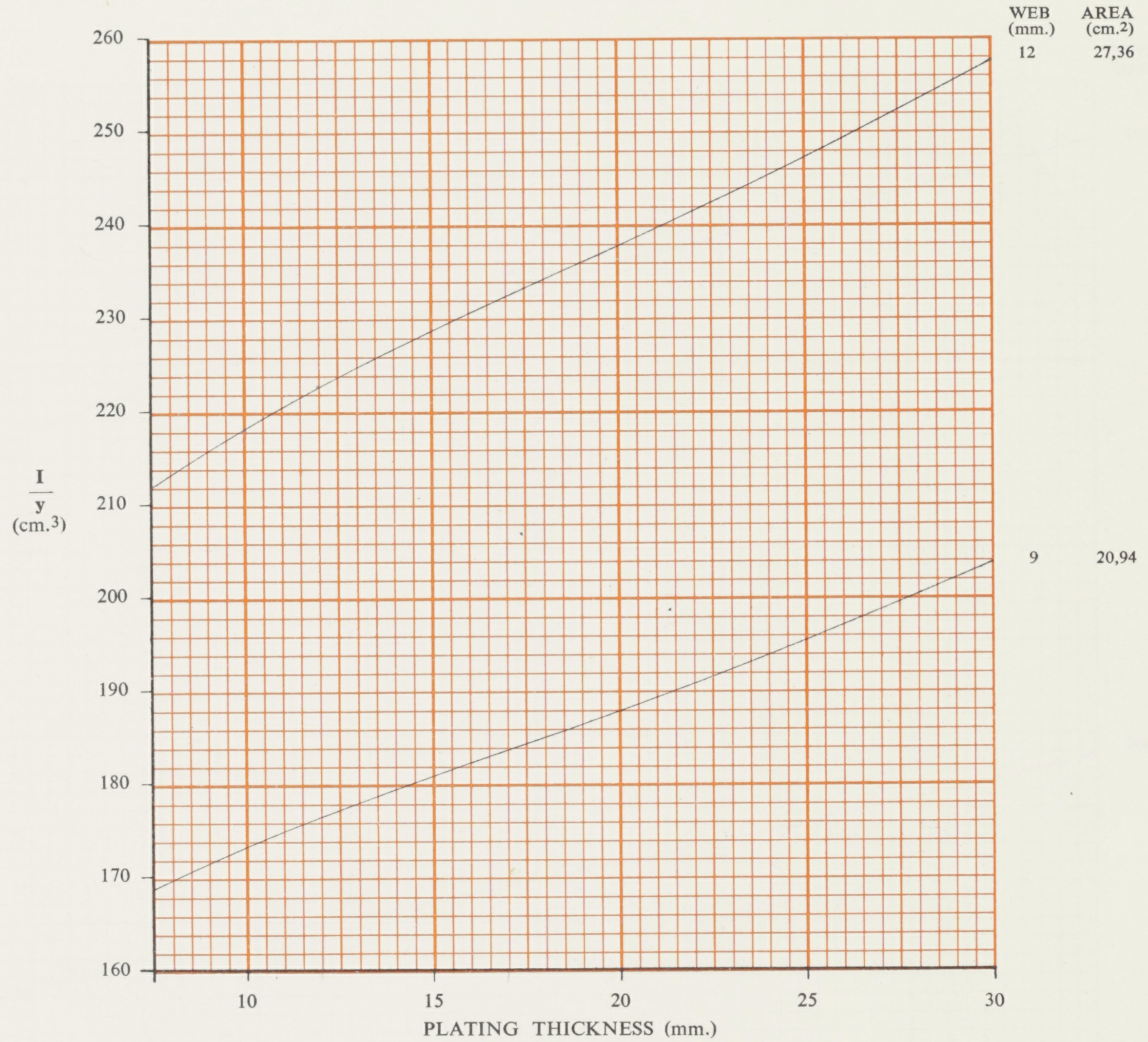
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



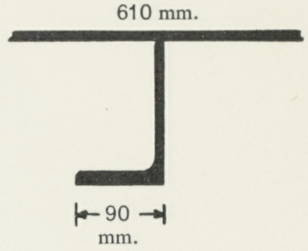
90 mm. FLANGE

150 mm. DEPTH

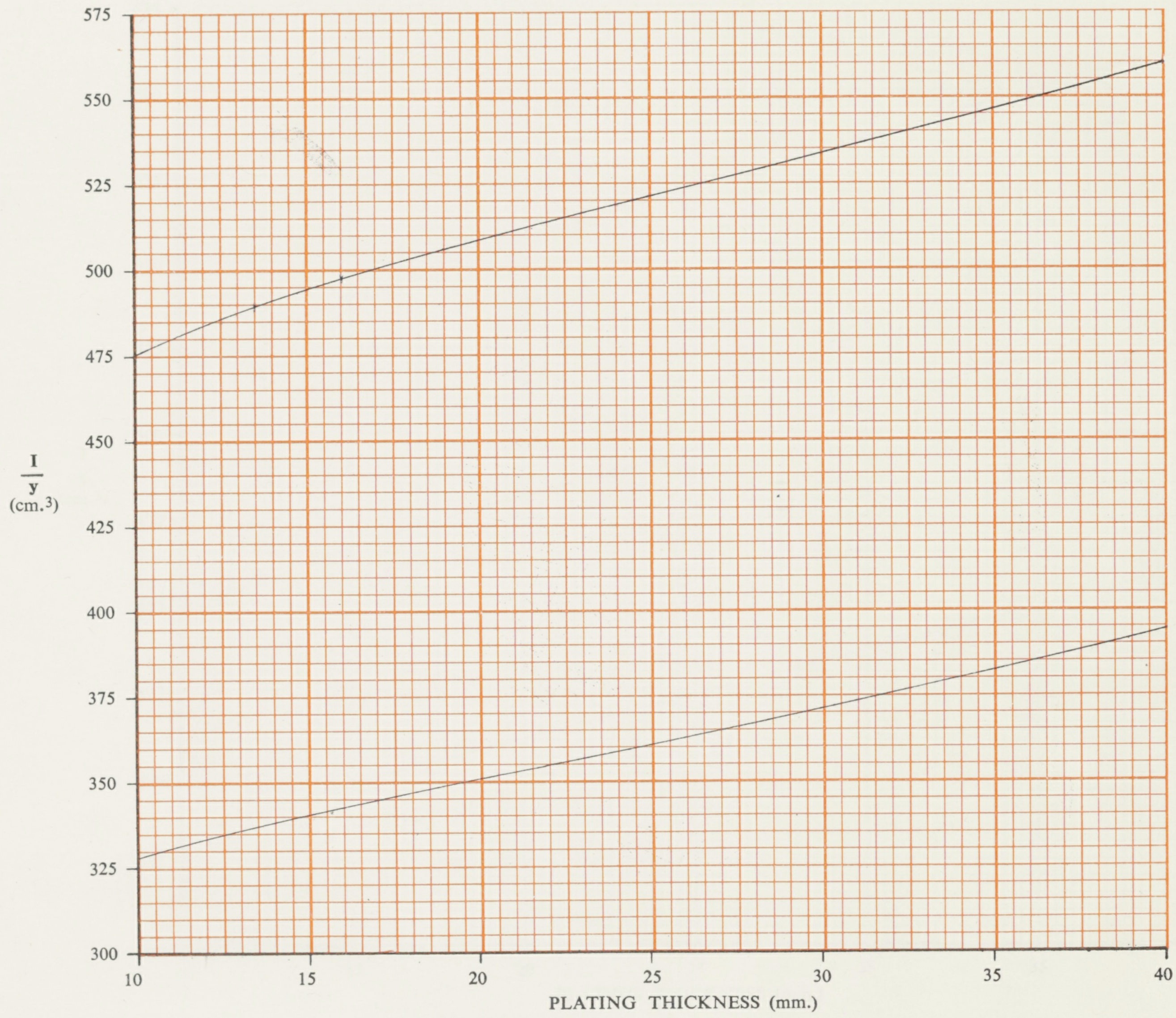


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



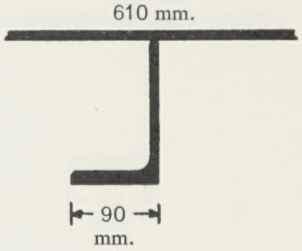
90 mm. FLANGE



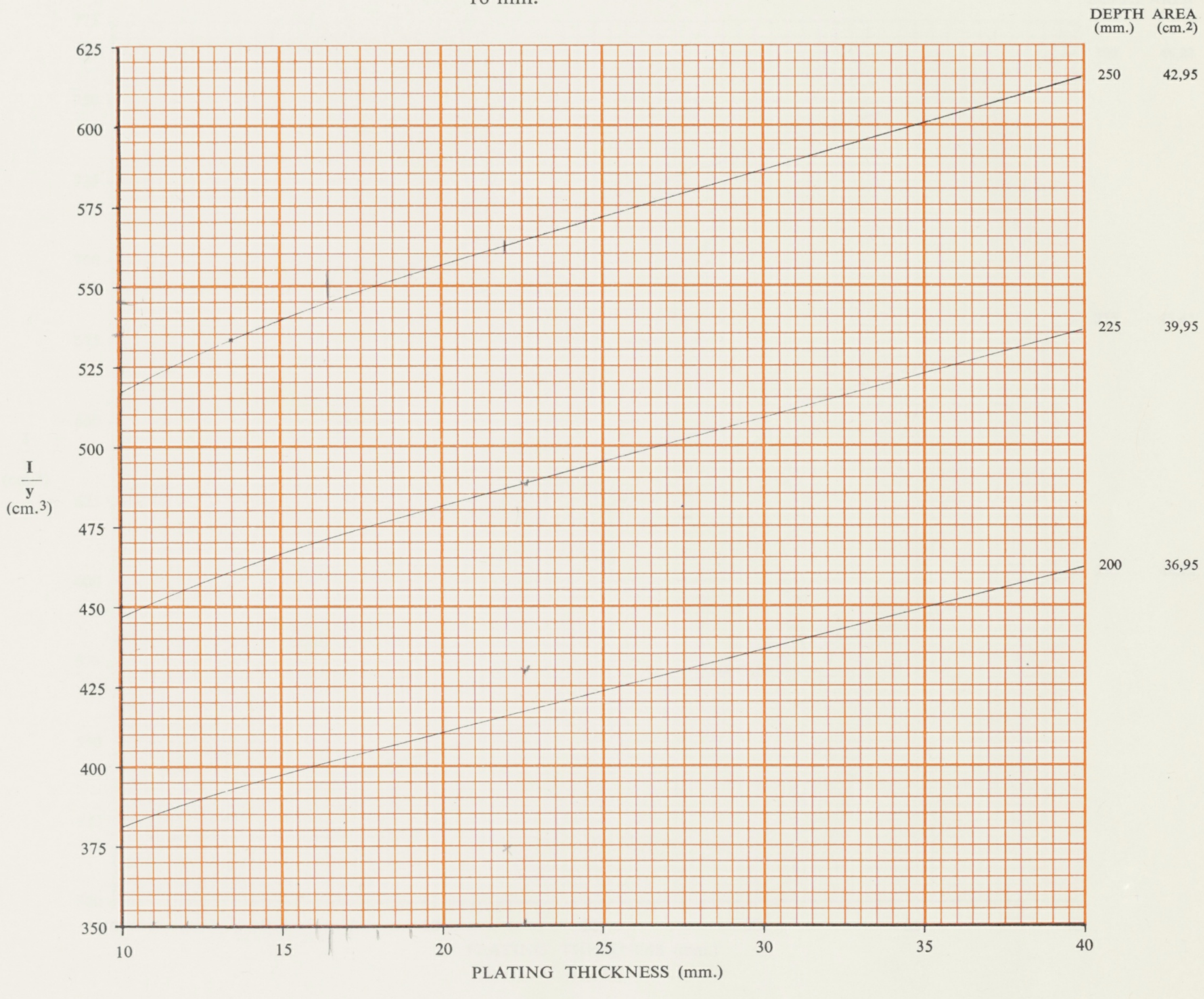
DEPTH (mm.)	WEB (mm.)	FLANGE (mm.)	AREA (cm.^{2})
250	10	15	37,47
200	9	14	29,66

SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

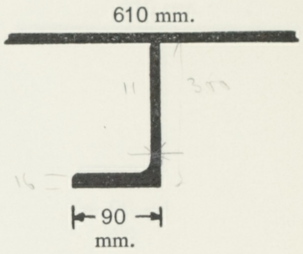


$250 \text{ mm.} \times 90 \text{ mm.} \times \frac{12 \text{ mm.}}{16 \text{ mm.}}$ Inverted Angle with Depth Variations

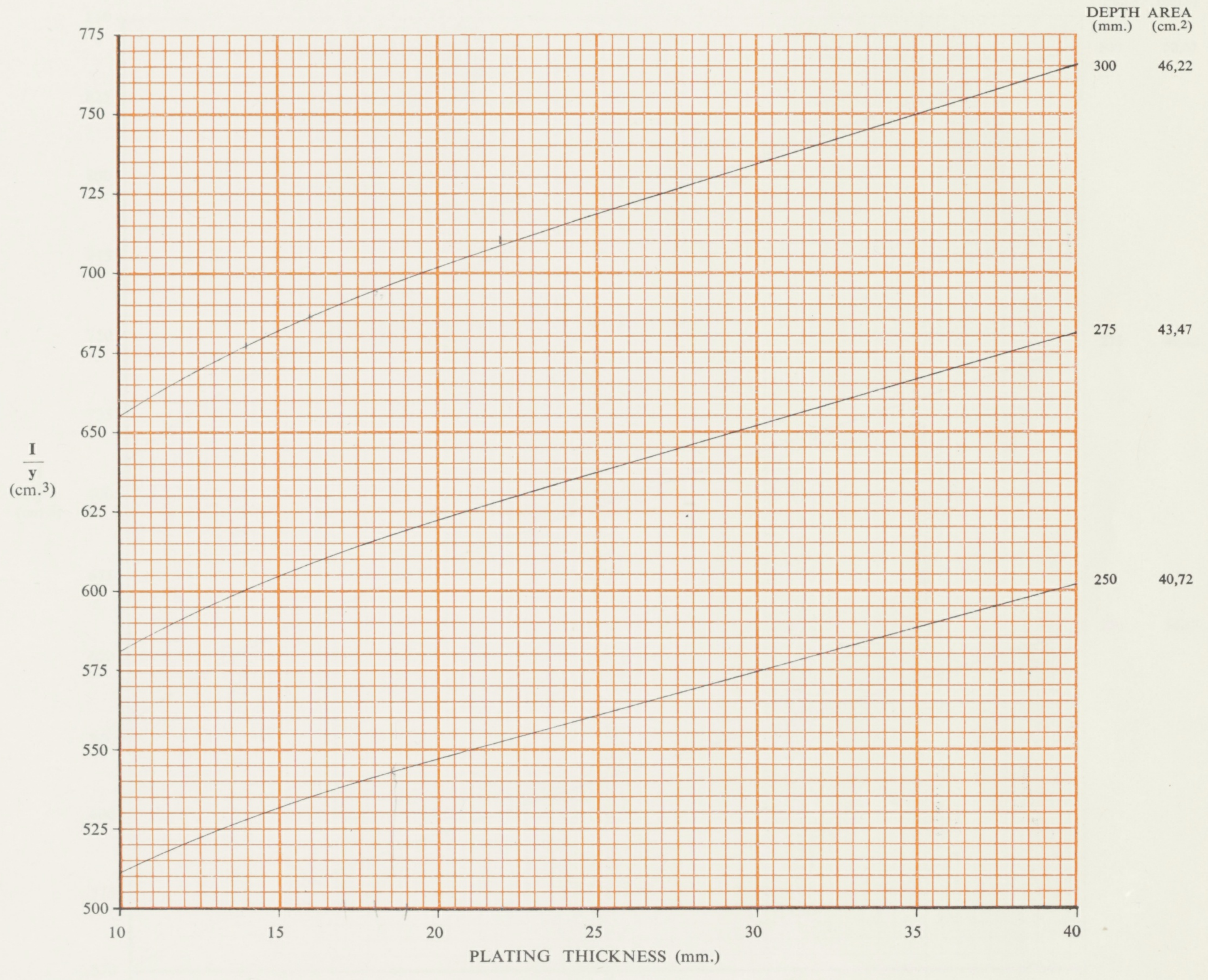


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



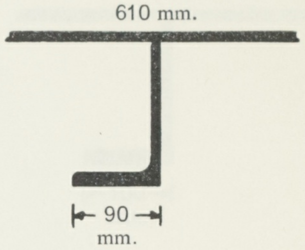
300 mm. × 90 mm. × $\frac{11 \text{ mm.}}{16 \text{ mm.}}$ Inverted Angle with Depth Variations



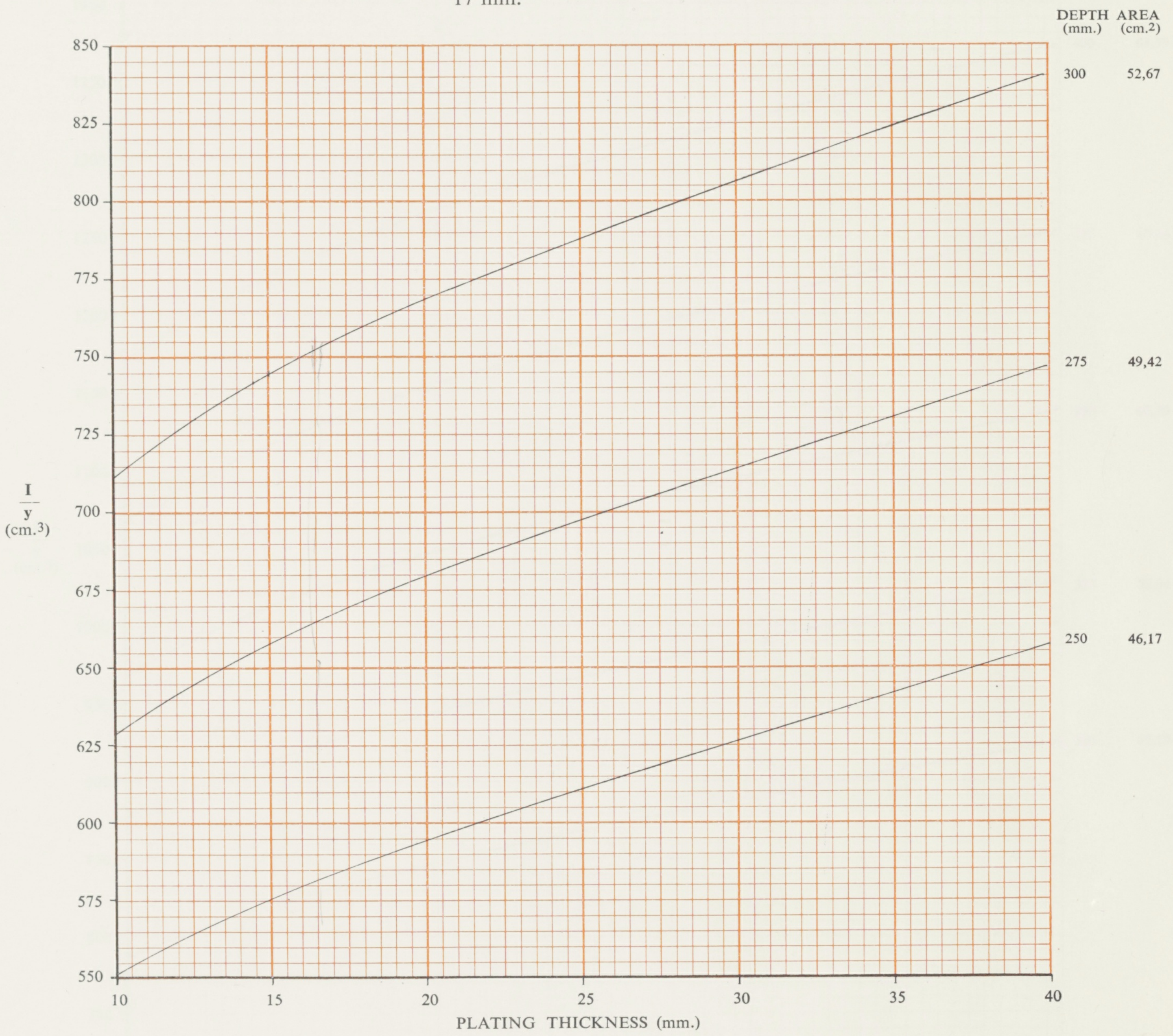
3 C

SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

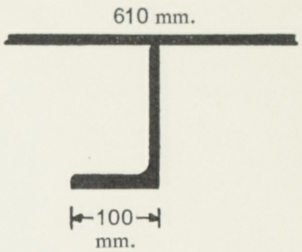


300 mm. × 90 mm. × $\frac{13 \text{ mm.}}{17 \text{ mm.}}$ Inverted Angle with Depth Variations

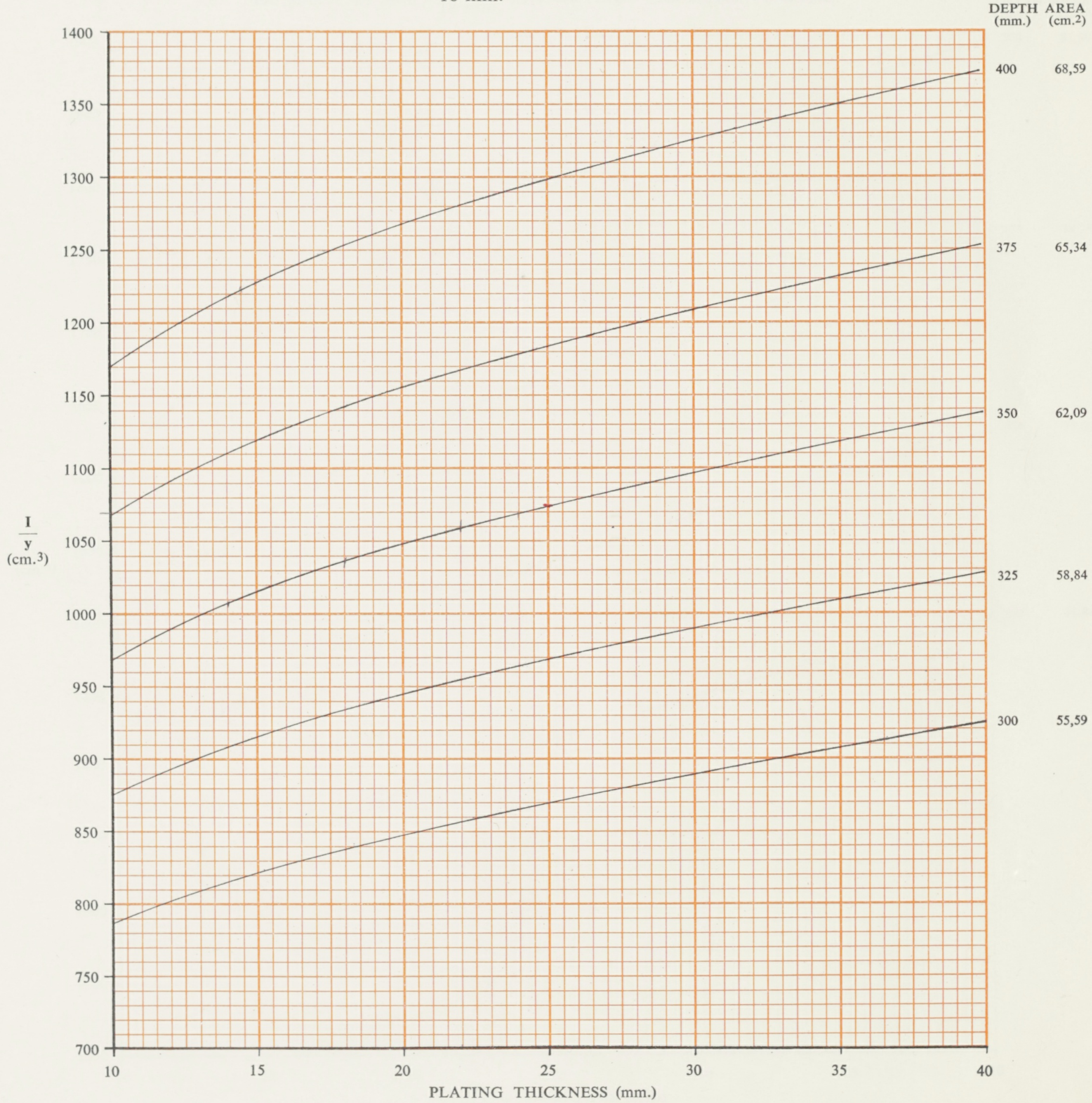


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

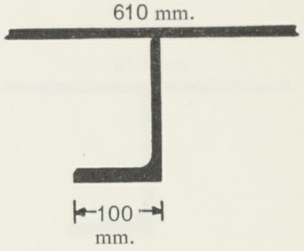


400 mm. × 100 mm. × $\frac{13 \text{ mm.}}{18 \text{ mm.}}$ Inverted Angle with Depth Variations

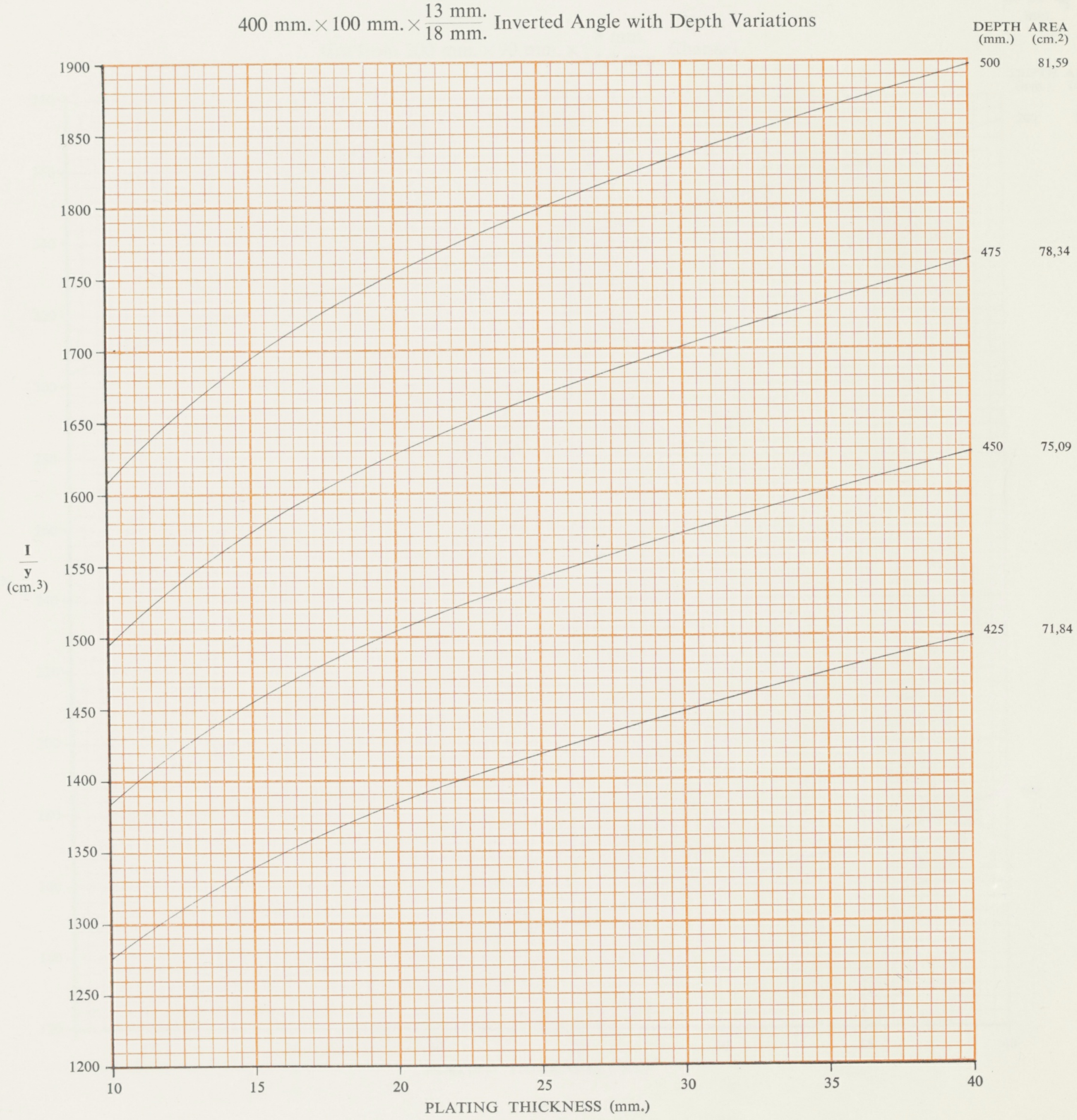


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

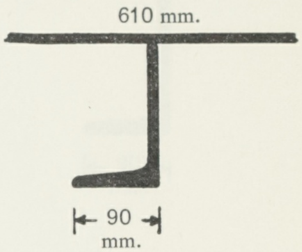


400 mm. × 100 mm. × $\frac{13\text{ mm.}}{18\text{ mm.}}$ Inverted Angle with Depth Variations

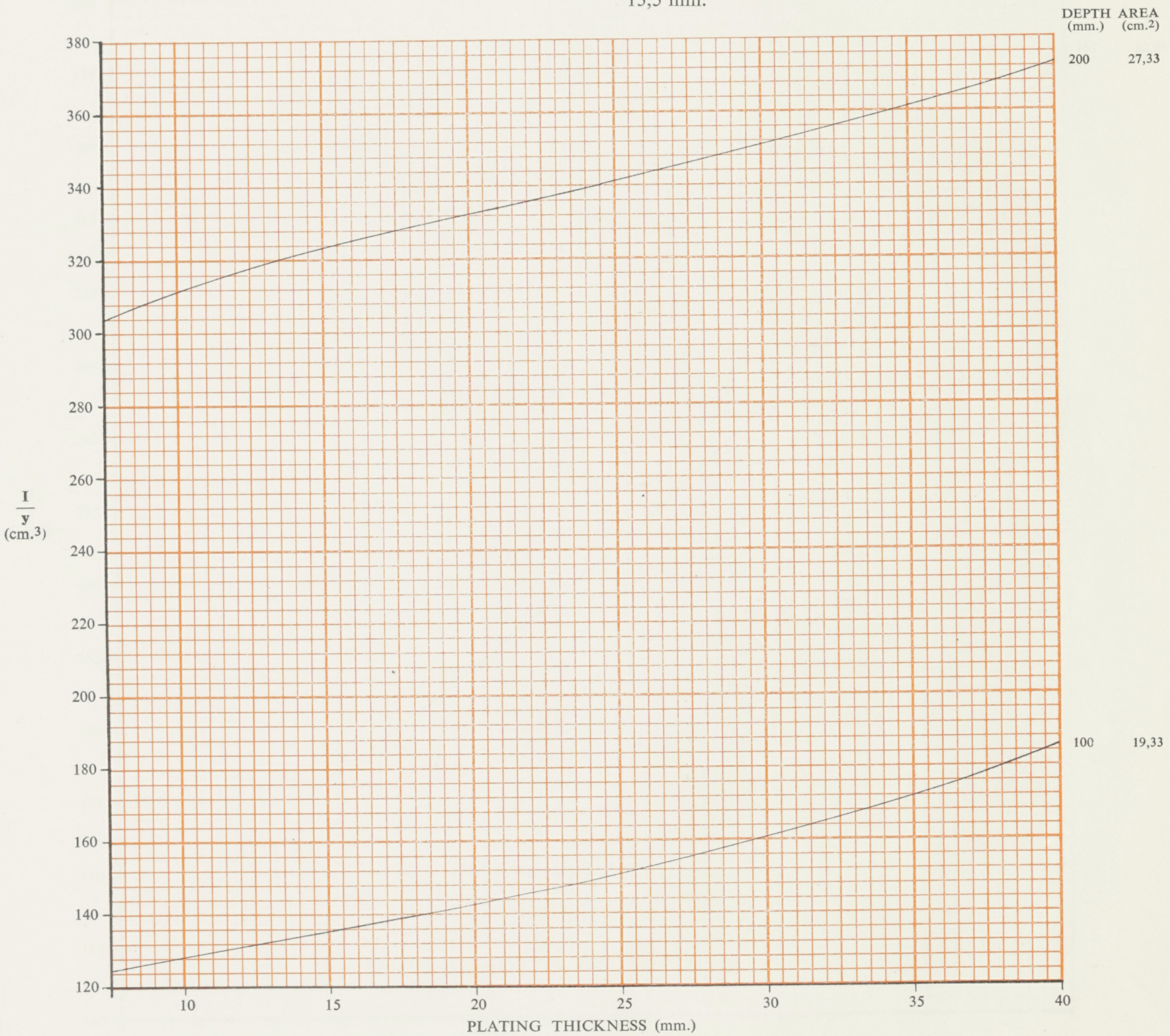


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

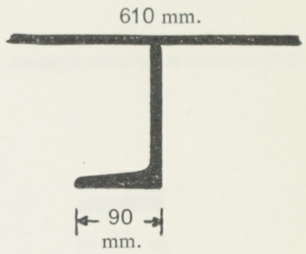


Cut from 200 mm. $\times$ 90 mm. $\times \frac{8 \text{ mm.}}{13{,}5 \text{ mm.}}$ Channel

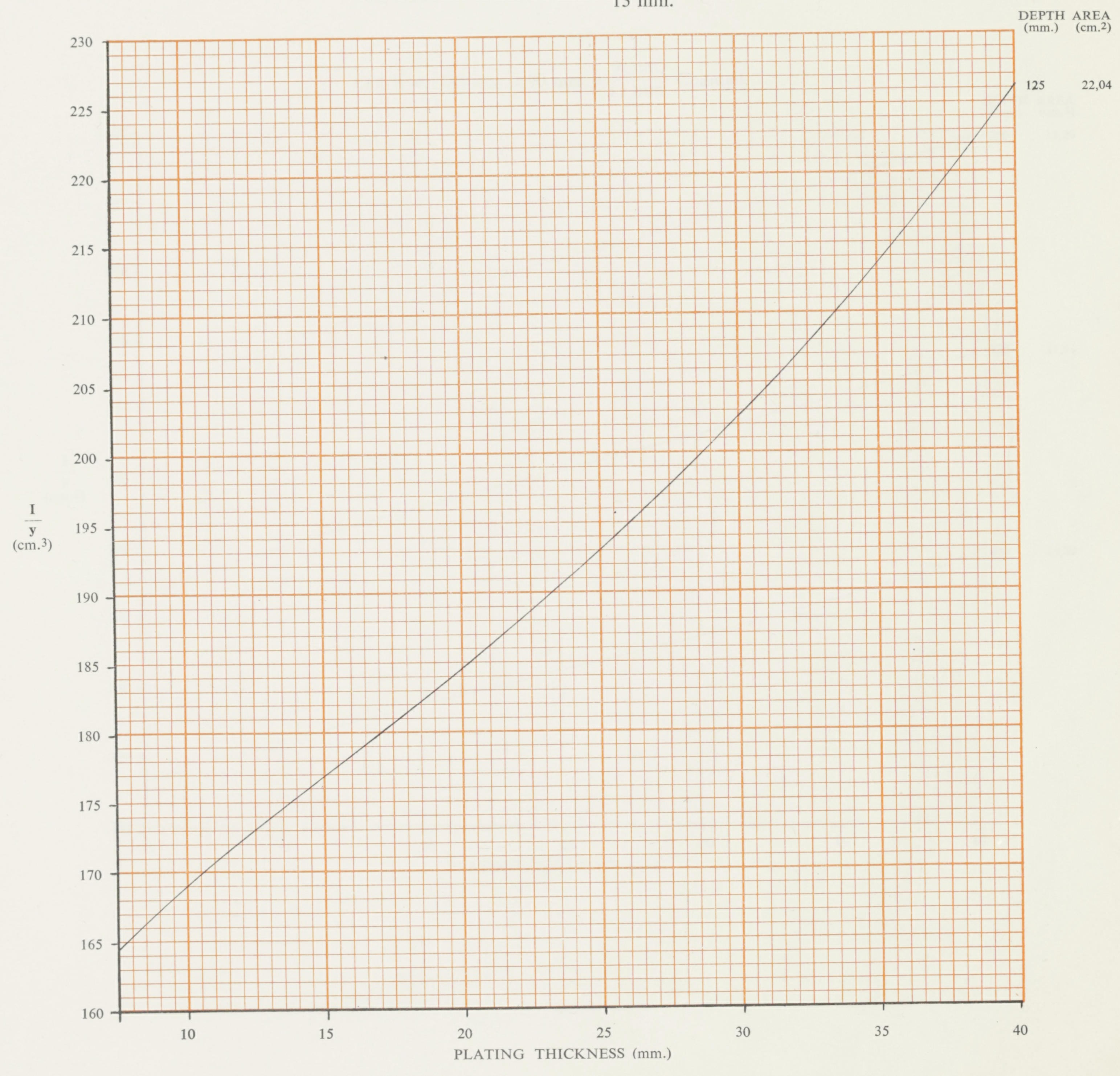


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

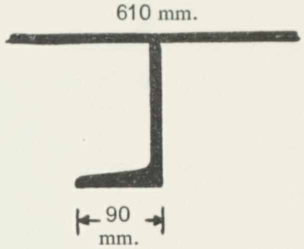


Cut from 250 mm. × 90 mm. × $\frac{9 \text{ mm.}}{13 \text{ mm.}}$ Channel

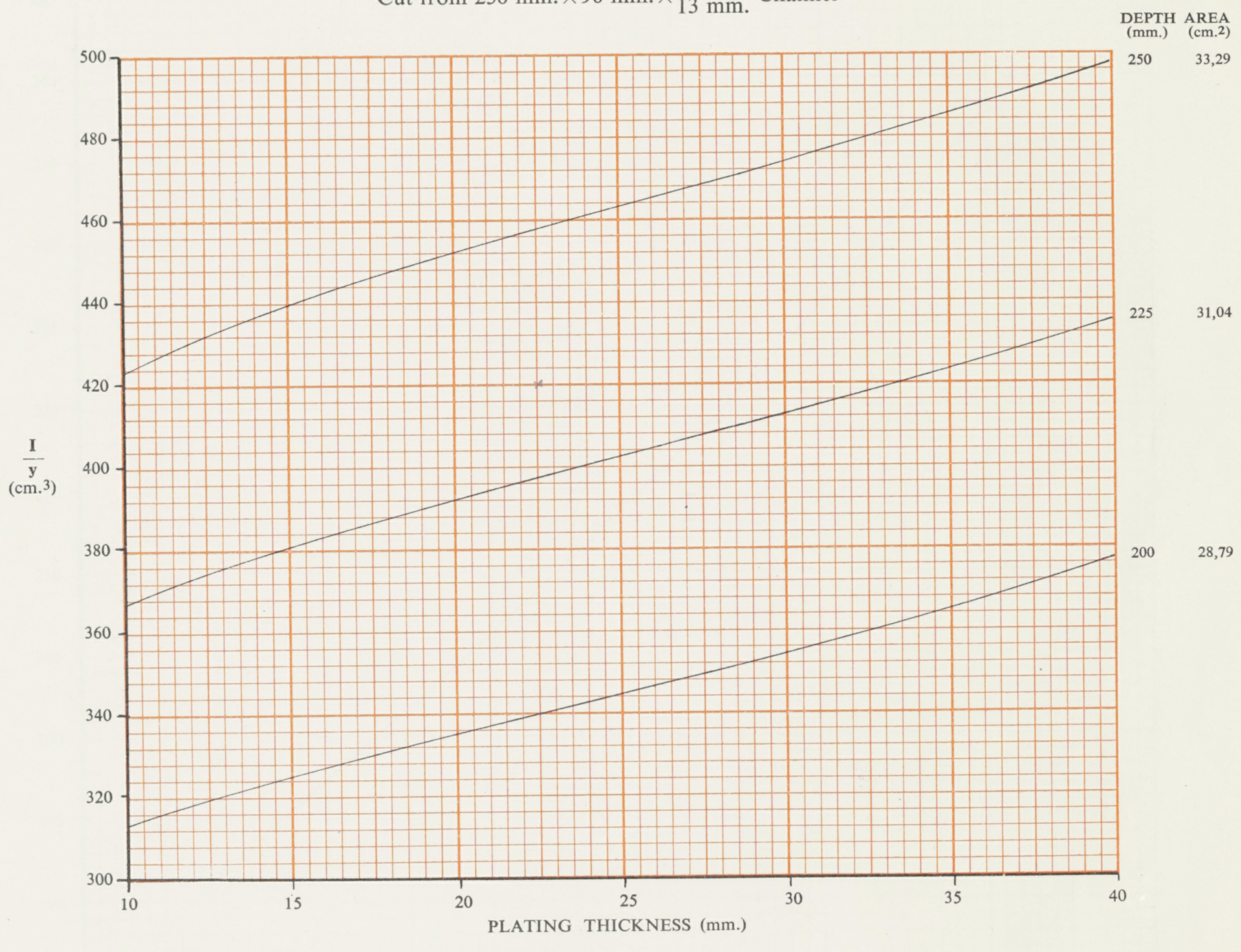


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

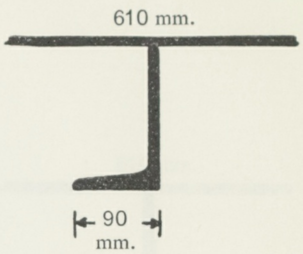


Cut from 250 mm. × 90 mm. × $\frac{9 \text{ mm.}}{13 \text{ mm.}}$ Channel

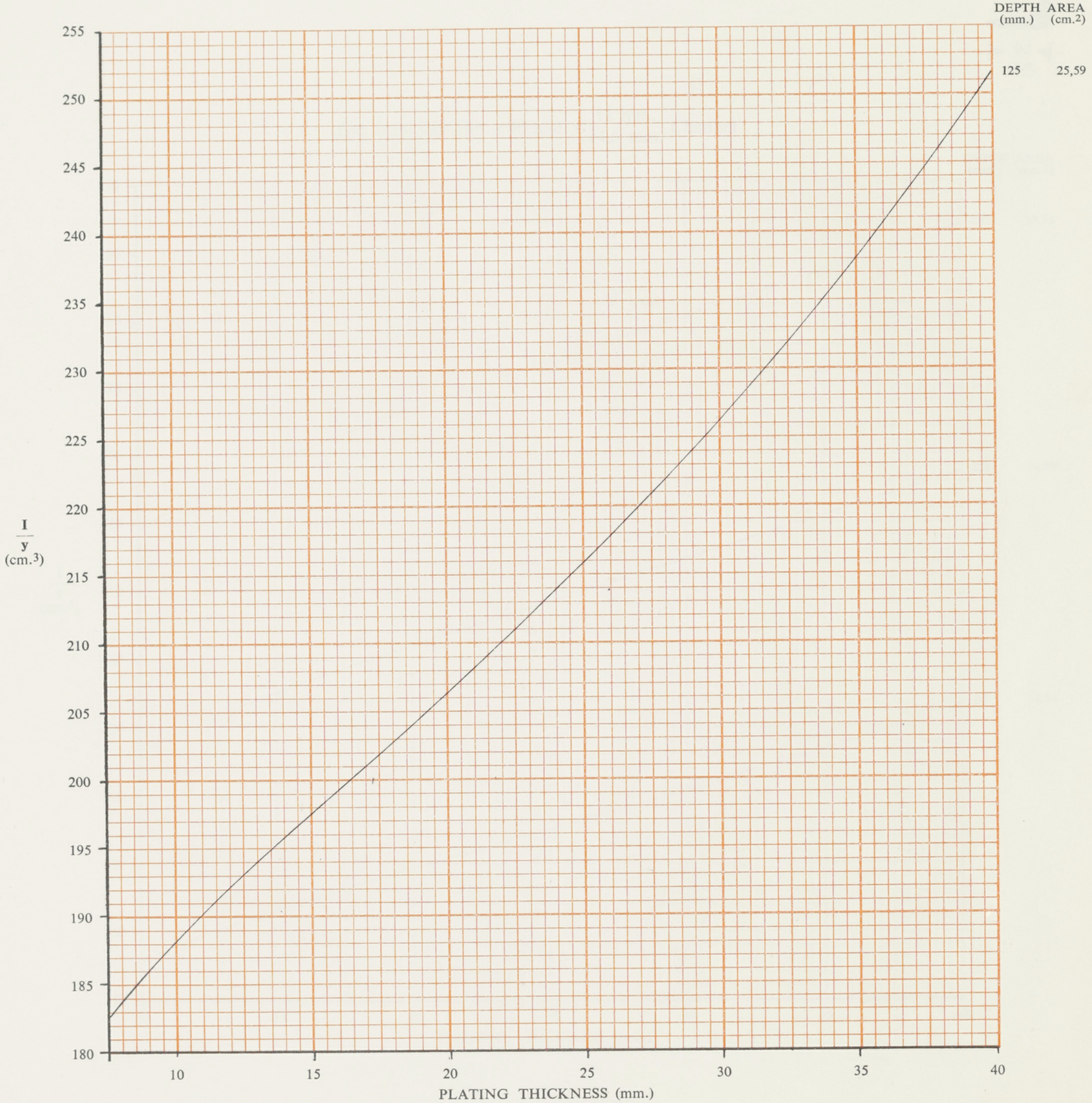


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

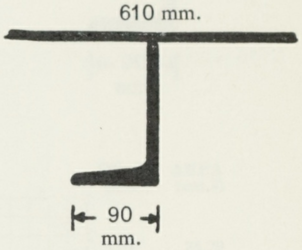


Cut from 250 mm. × 90 mm. × $\frac{11 \text{ mm.}}{14,5 \text{ mm.}}$ Channel

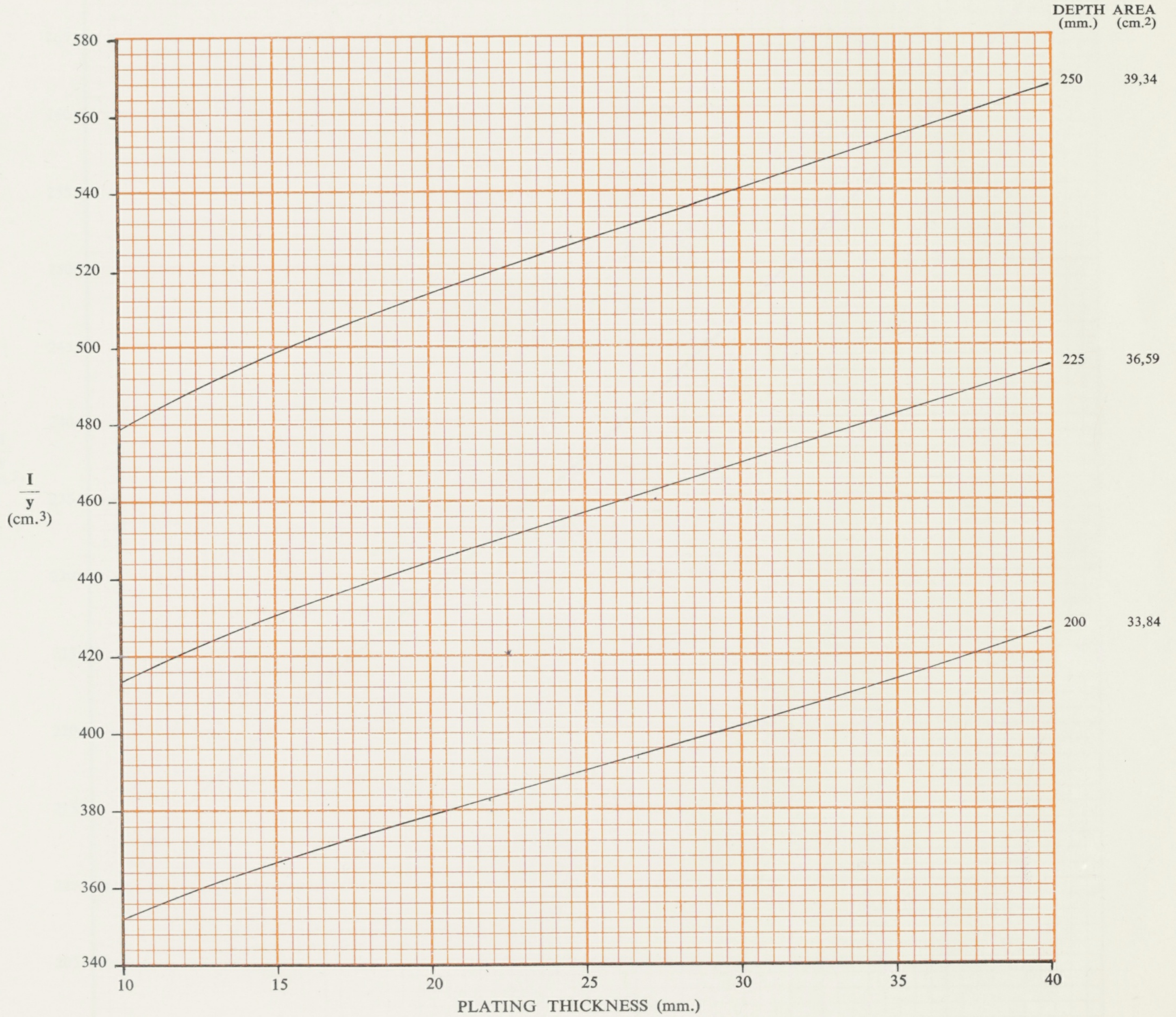


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



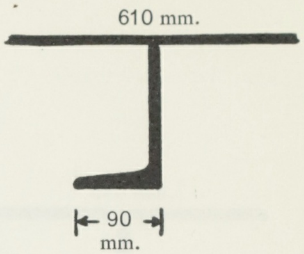
Cut from 250 mm. $\times$ 90 mm. $\times \frac{11 \text{ mm.}}{14{,}5 \text{ mm.}}$ Channel



3 D

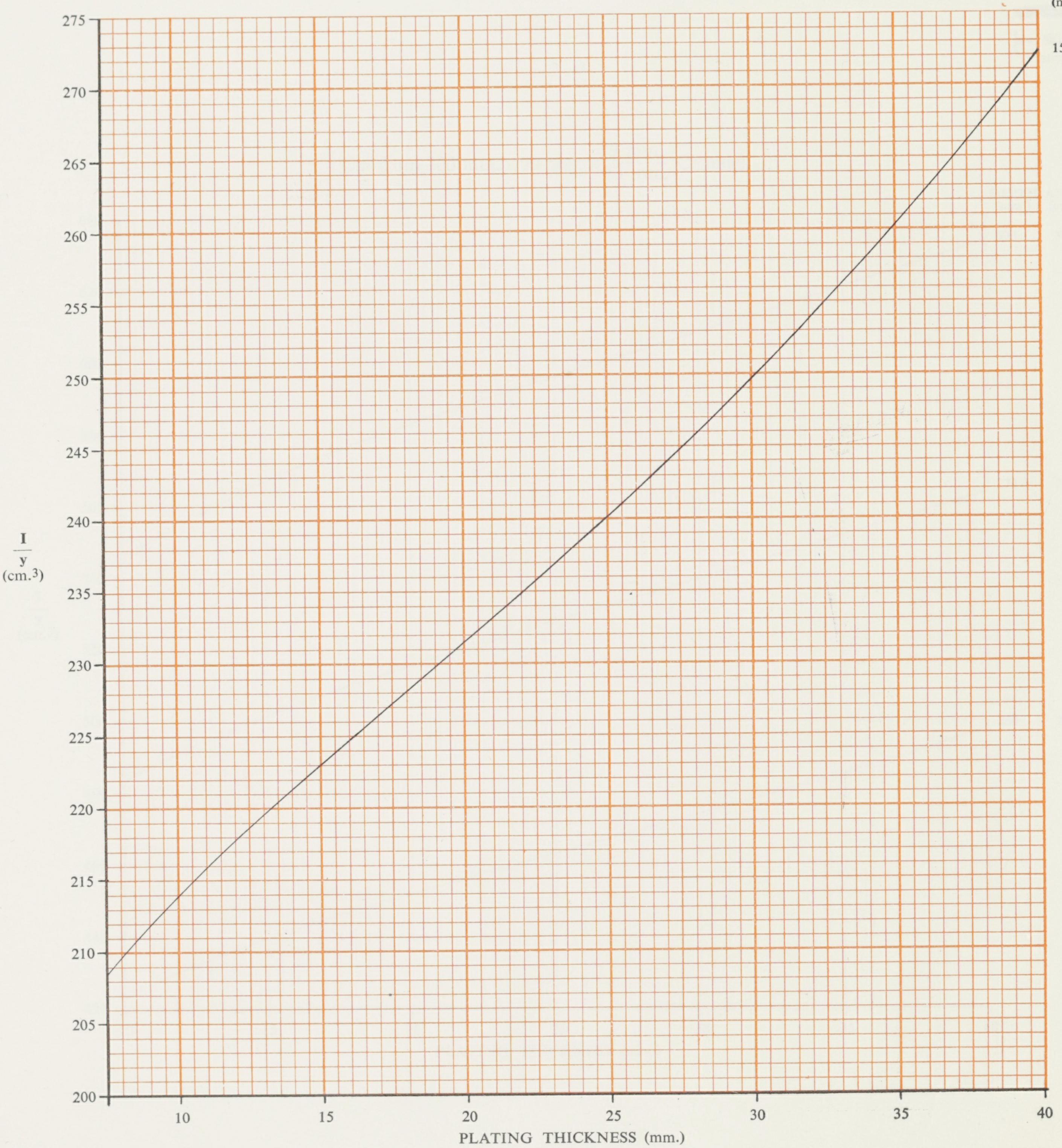
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



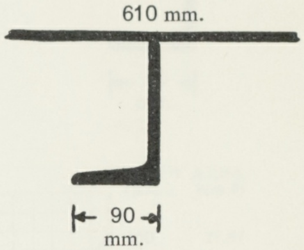
Cut from 300 mm. × 90 mm. × $\frac{9 \text{ mm.}}{13 \text{ mm.}}$ Channel

DEPTH (mm.)	AREA (cm.^{2})
150	24,29

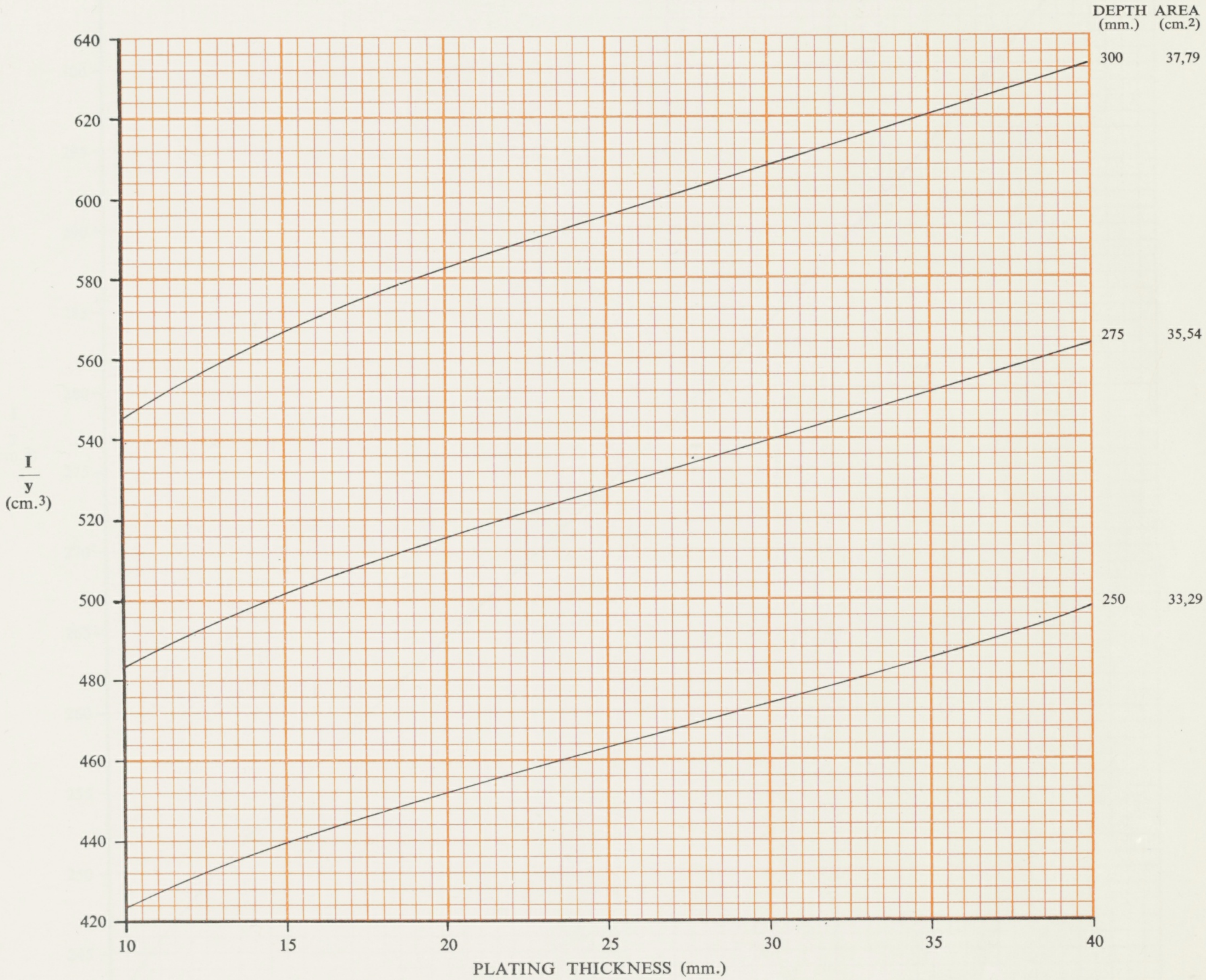


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

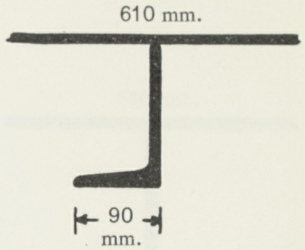


Cut from 300 mm. × 90 mm. × $\frac{9\text{ mm.}}{13\text{ mm.}}$ Channel

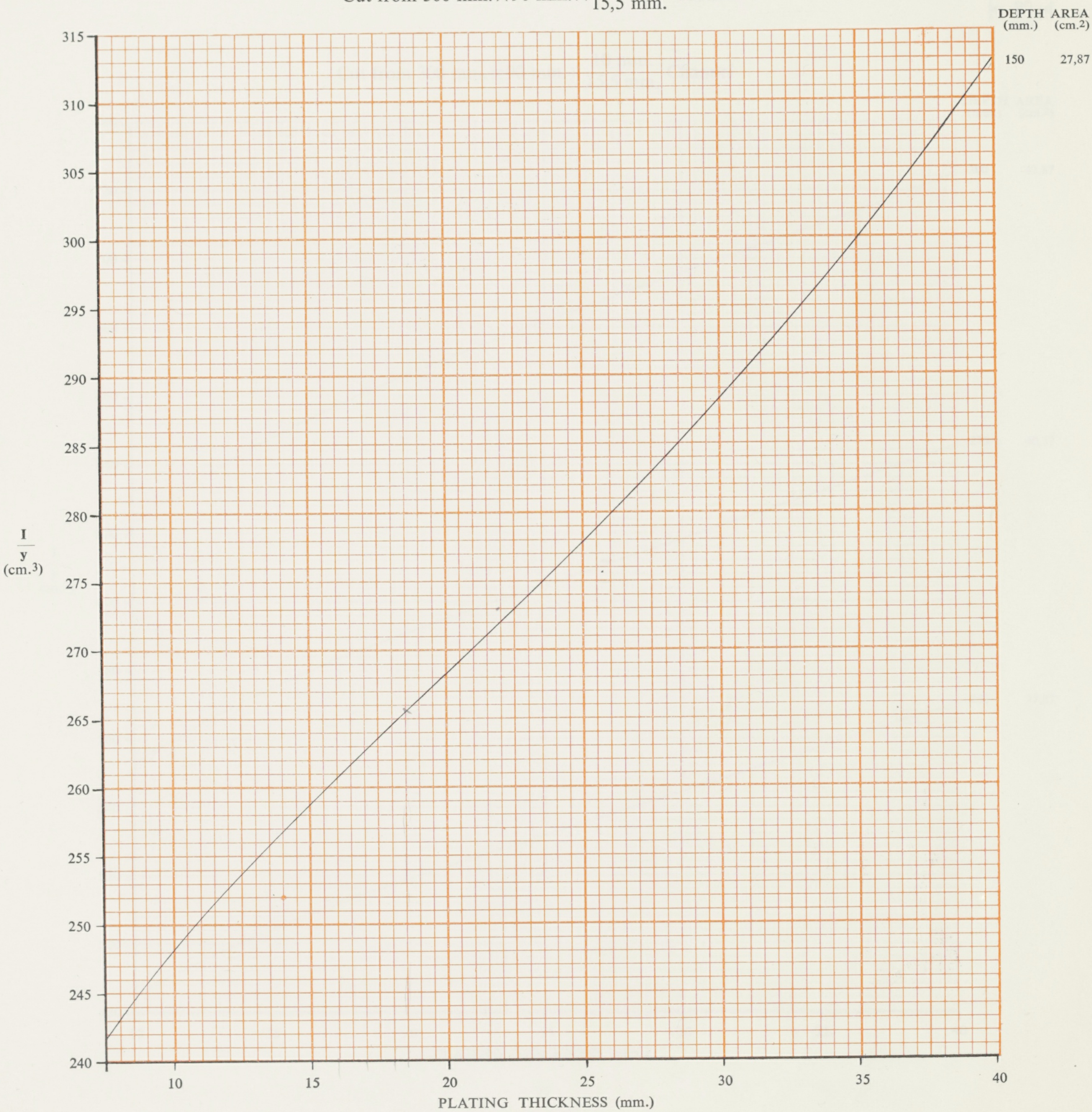


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

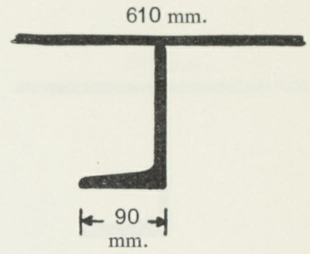


Cut from 300 mm. $\times$ 90 mm. $\times \frac{10 \text{ mm.}}{15{,}5 \text{ mm.}}$ Channel

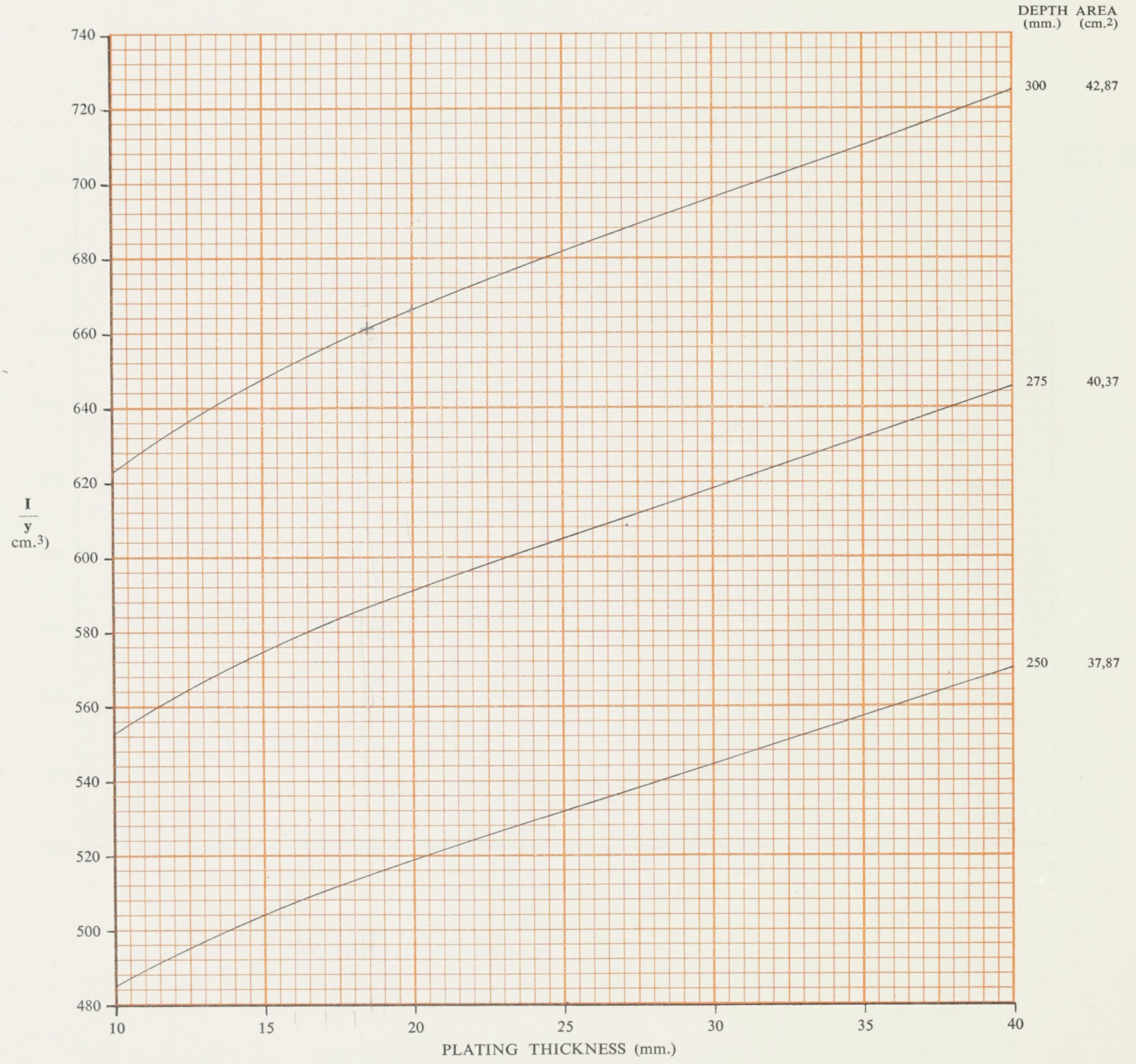


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

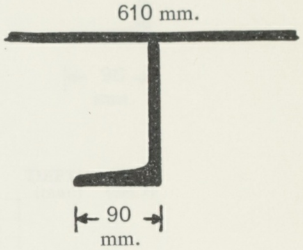


Cut from 300 mm. $\times$ 90 mm. $\times \frac{10 \text{ mm.}}{15{,}5 \text{ mm.}}$ Channel

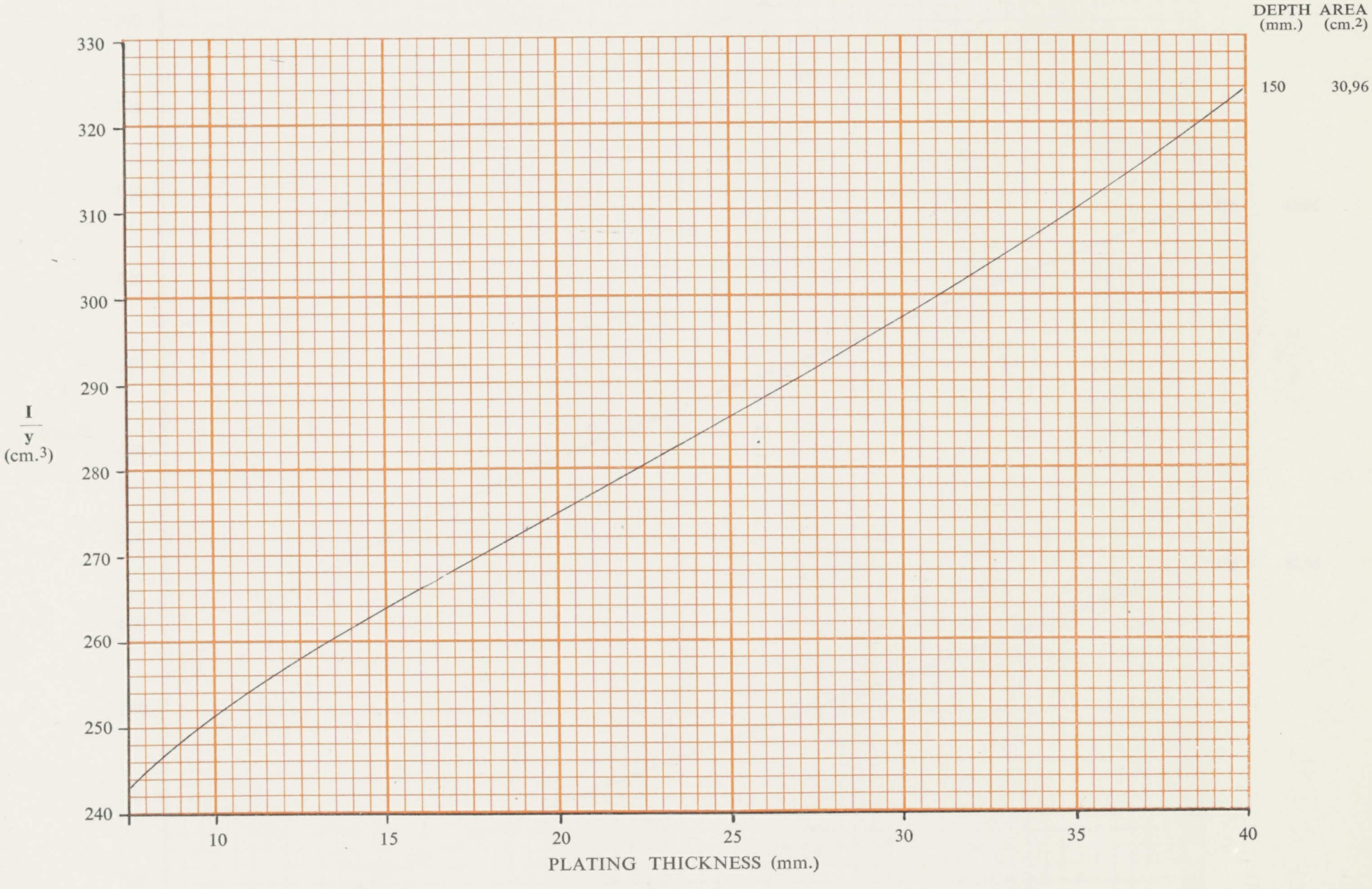


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

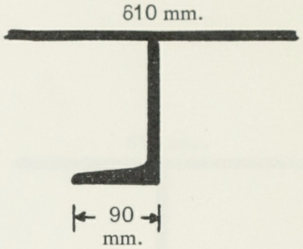


Cut from 300 mm. $\times$ 90 mm. $\times \frac{12 \text{ mm.}}{16 \text{ mm.}}$ Channel

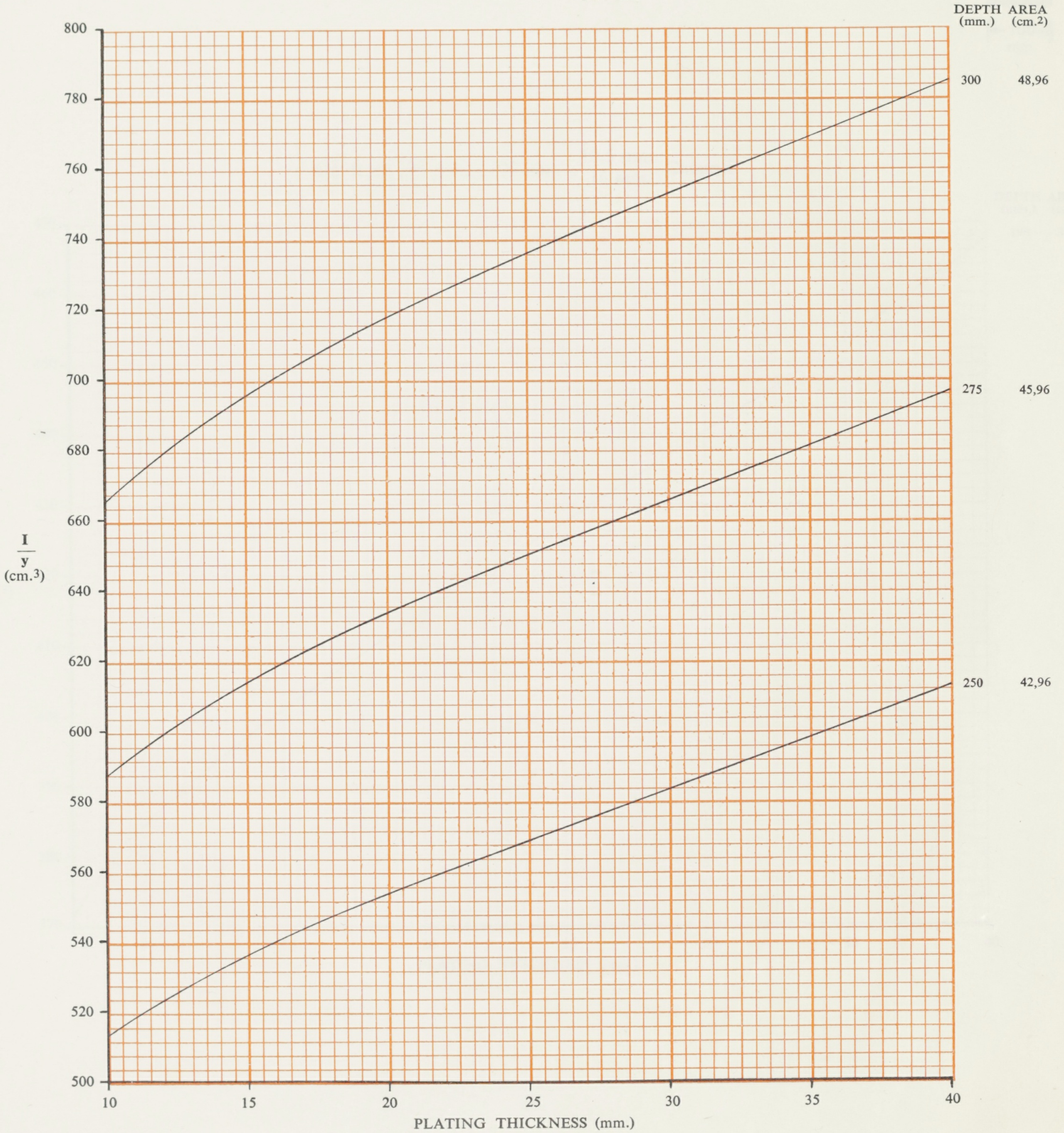


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

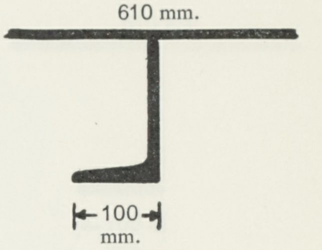


Cut from 300 mm. $\times$ 90 mm. $\times \frac{12 \text{ mm.}}{16 \text{ mm.}}$ Channel



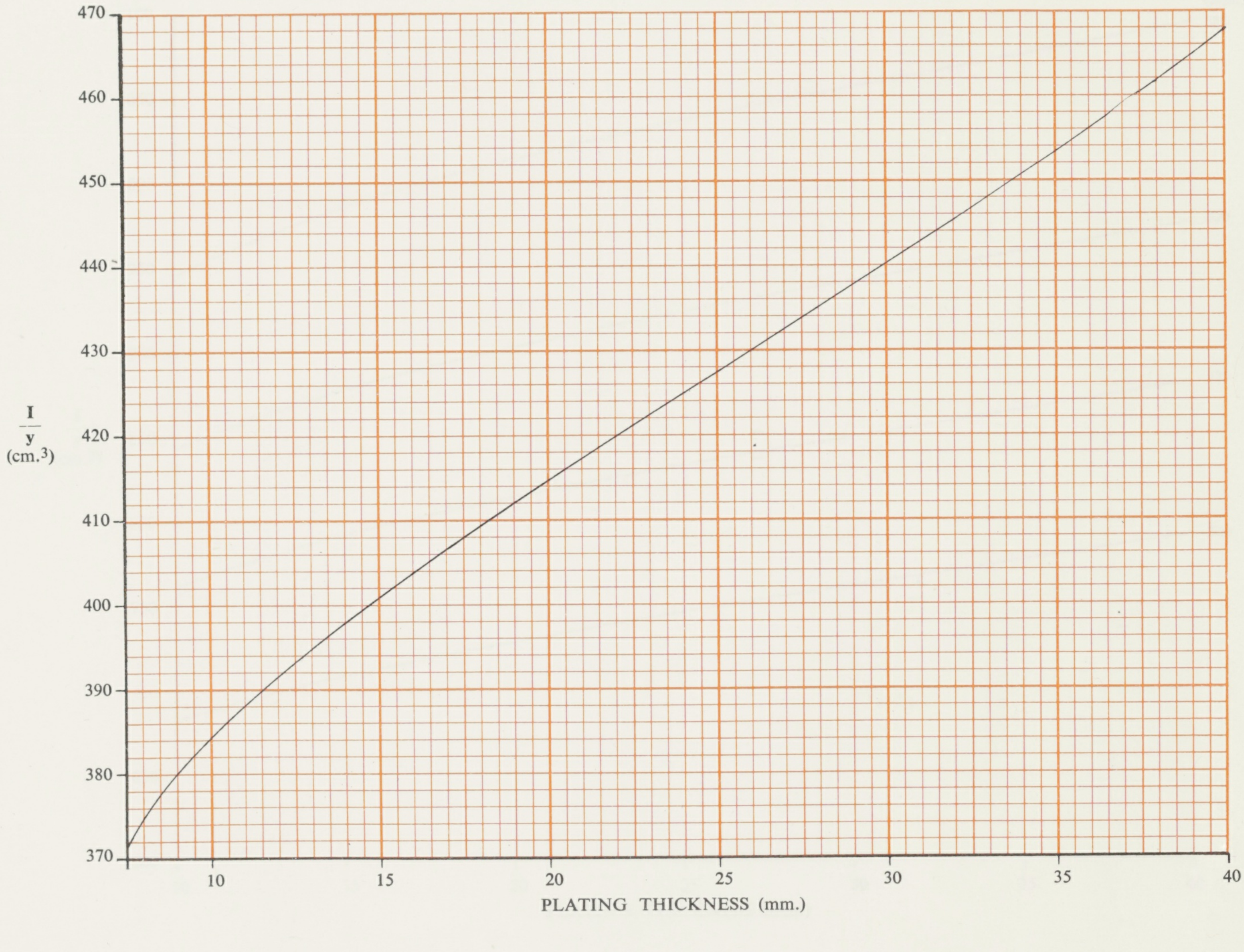
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



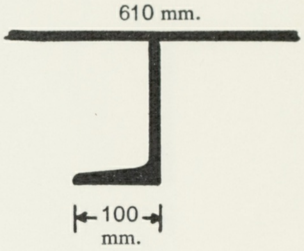
Cut from 380 mm. $\times$ 100 mm. $\times \dfrac{10{,}5 \text{ mm.}}{16 \text{ mm.}}$ Channel

DEPTH (mm.)	AREA ($cm.^2$)
190	36,69

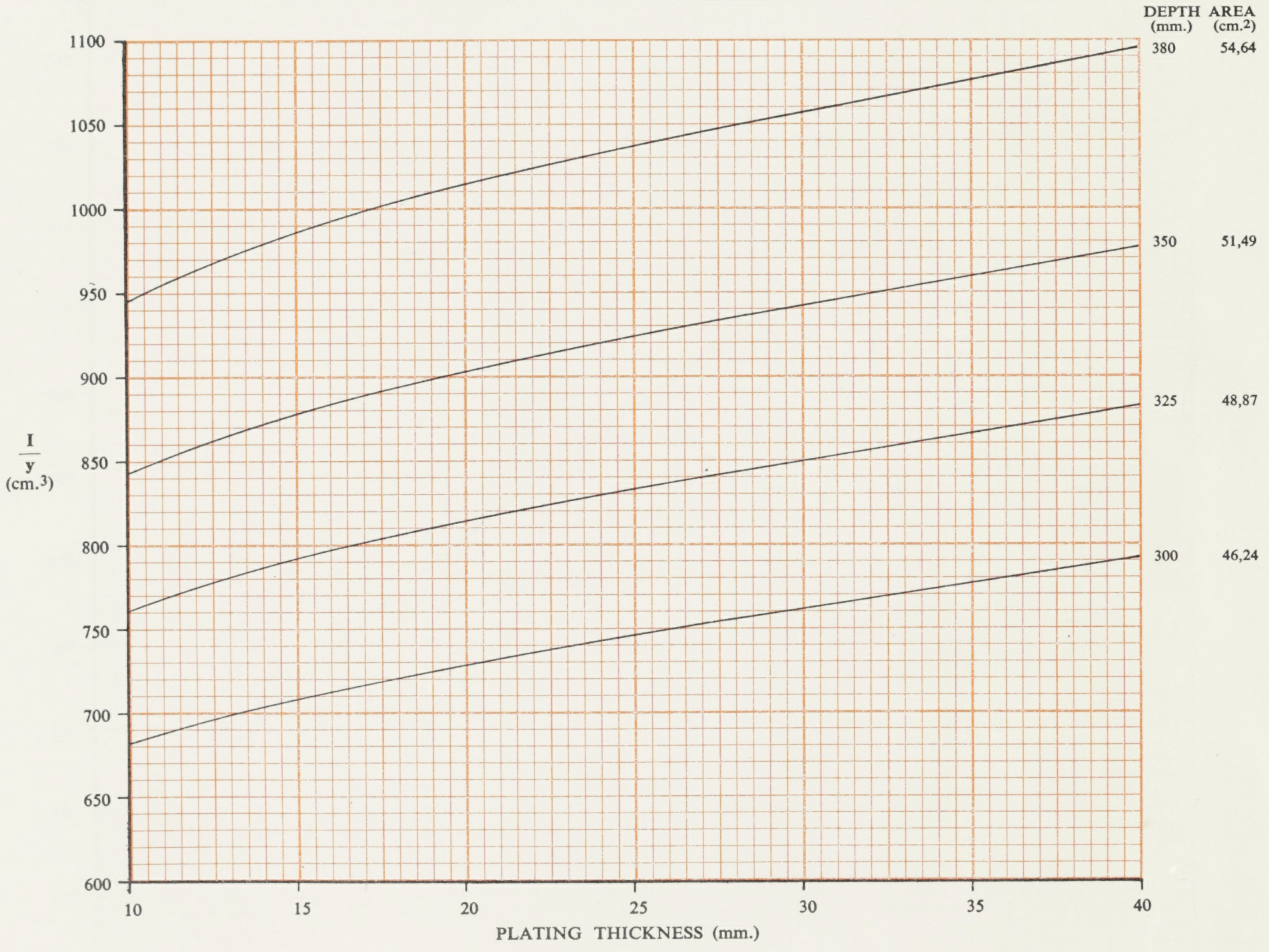


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



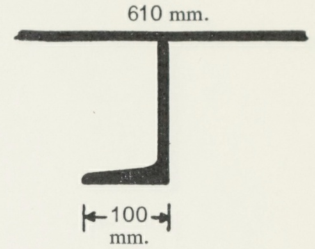
Cut from 380 mm. × 100 mm. × $\frac{10,5 \text{ mm.}}{16 \text{ mm.}}$ Channel



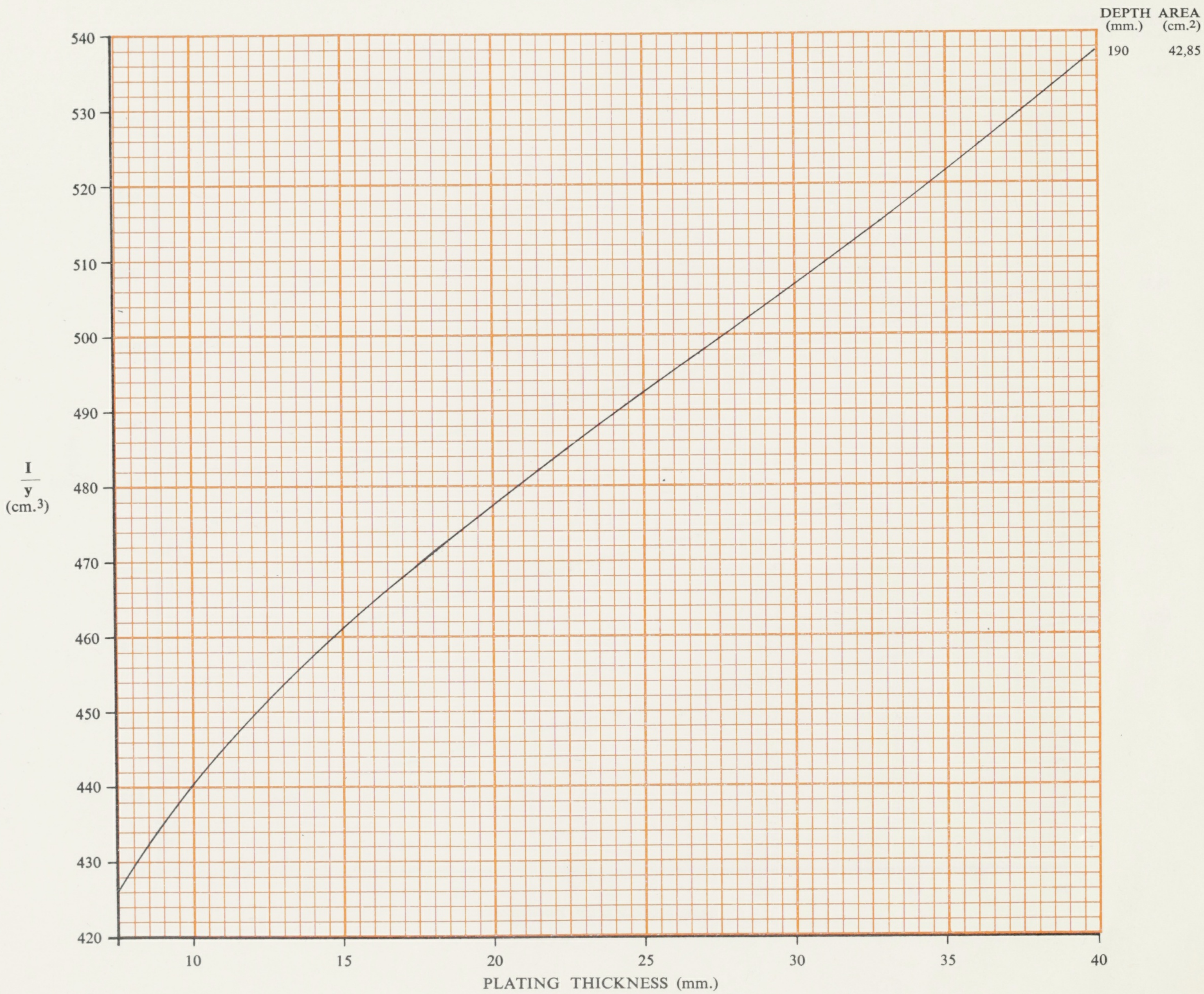
3 E

SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

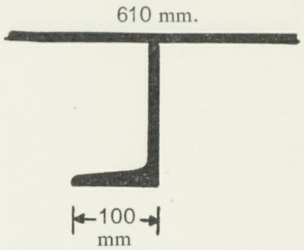


Cut from 380 mm. $\times$ 100 mm. $\times \frac{13 \text{ mm.}}{20 \text{ mm.}}$ Channel

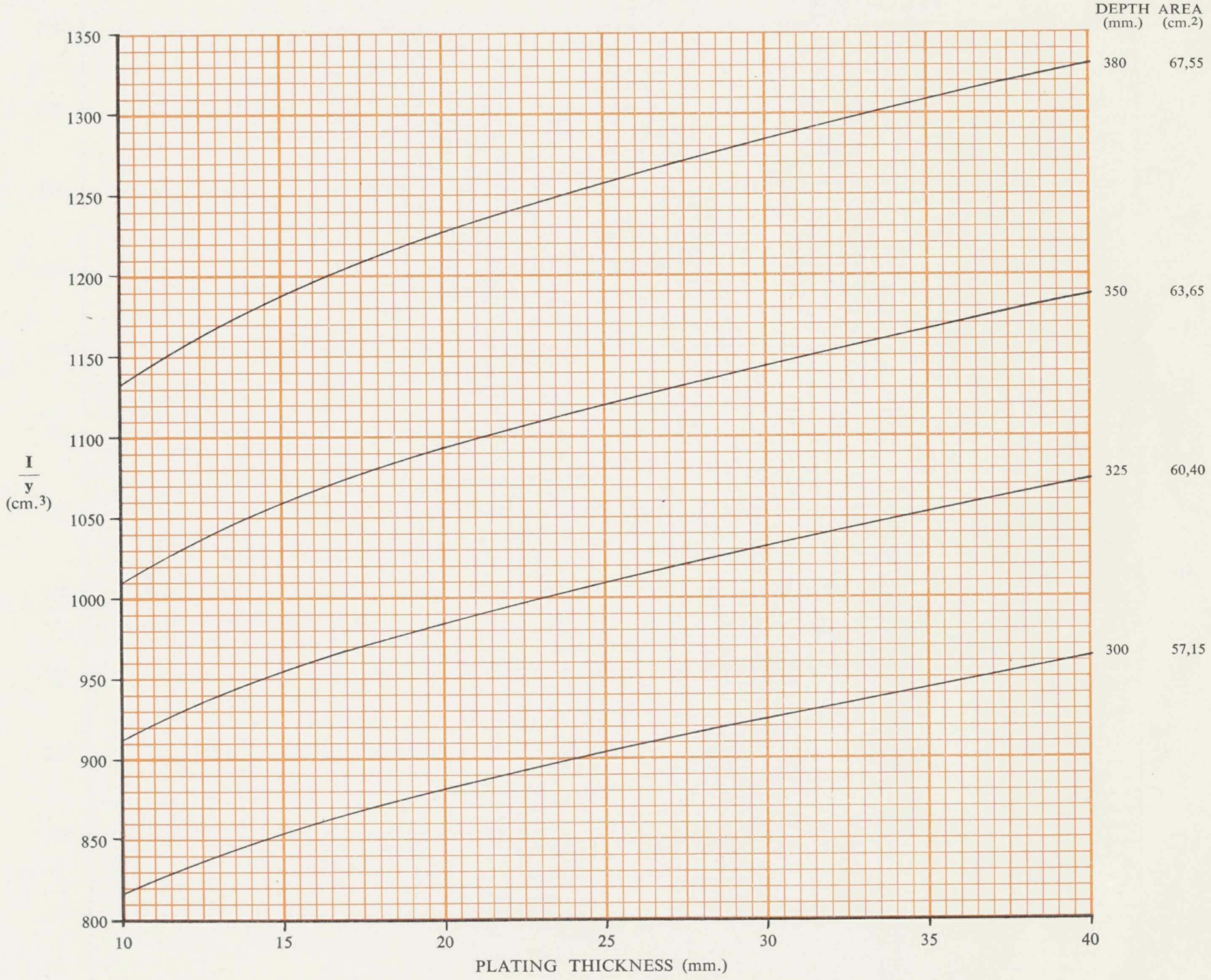


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

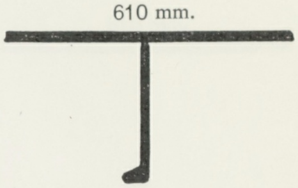


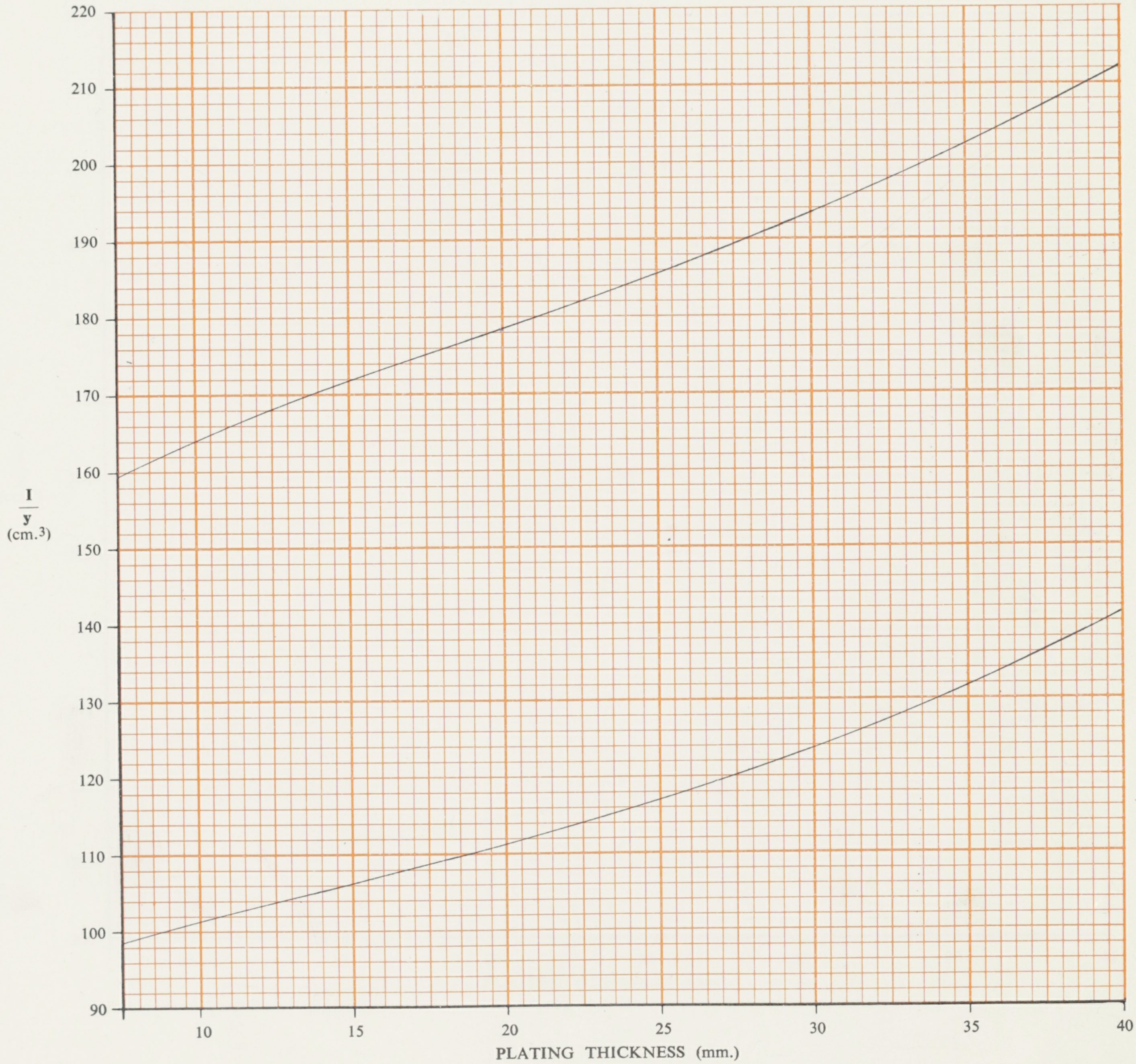
Cut from 380 mm. $\times$ 100 mm. $\times \dfrac{13\text{ mm.}}{20\text{ mm.}}$ Channel



SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

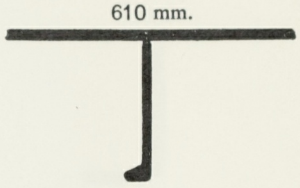


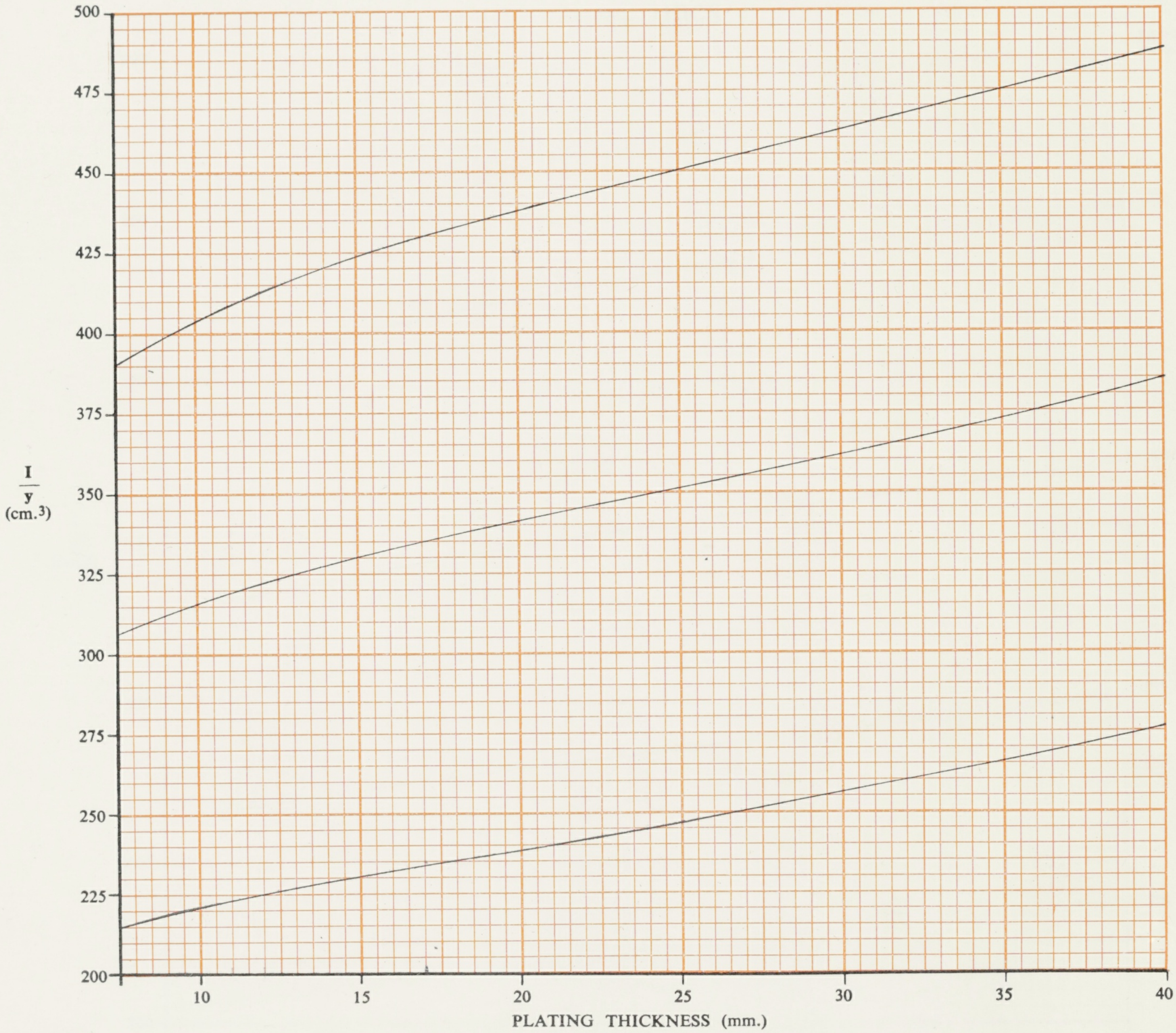


DEPTH (mm.)	WEB (mm.)	AREA (cm.²)
180	9,5	21,06
150	8,0	14,96

SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

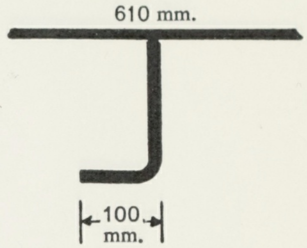




DEPTH (mm.)	WEB (mm.)	AREA (cm.2)
250	12	38,13
230	11	31,98
200	10	25,23

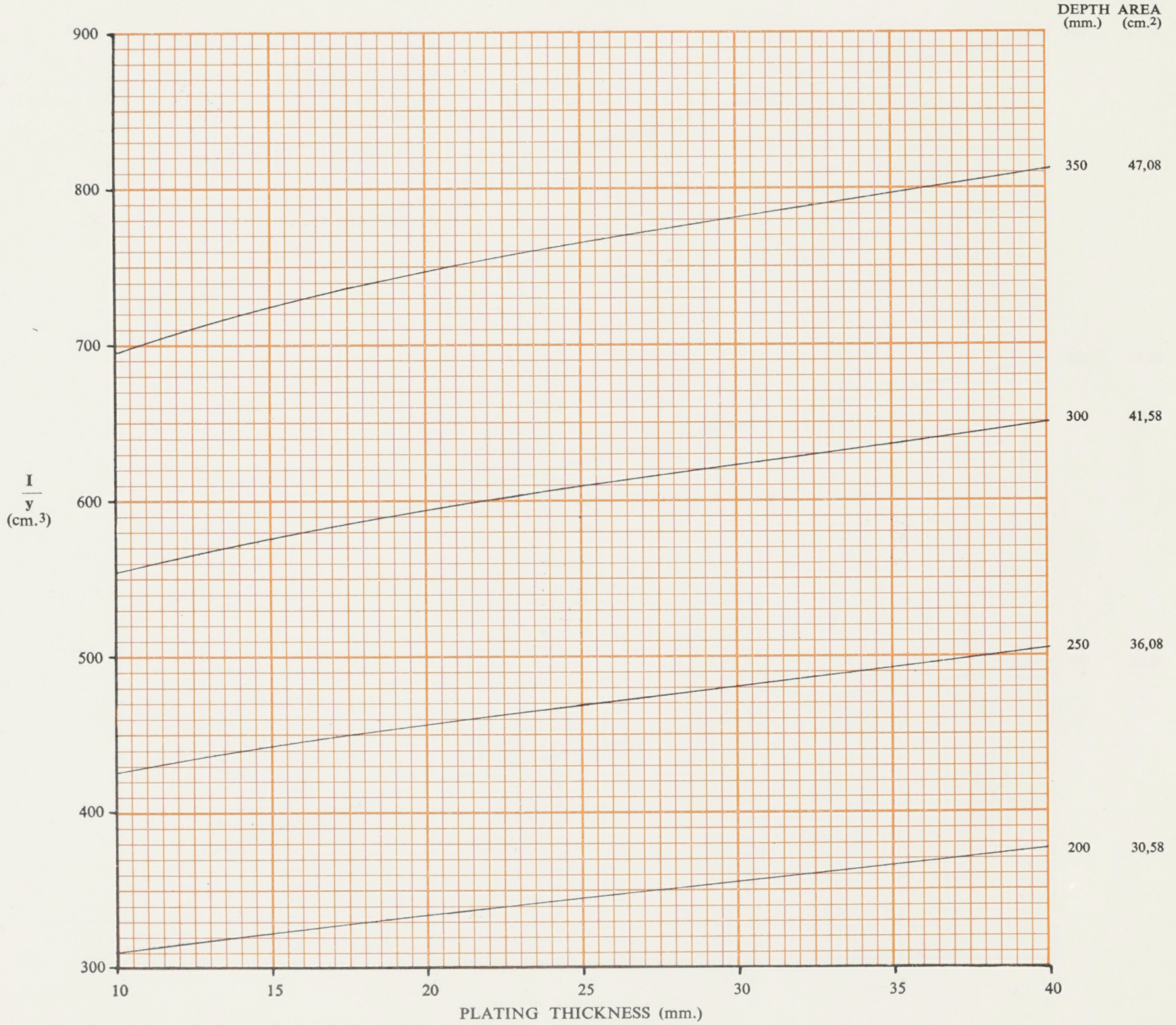
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



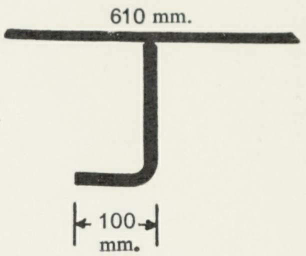
100 mm. FLANGE

11 mm. THICK



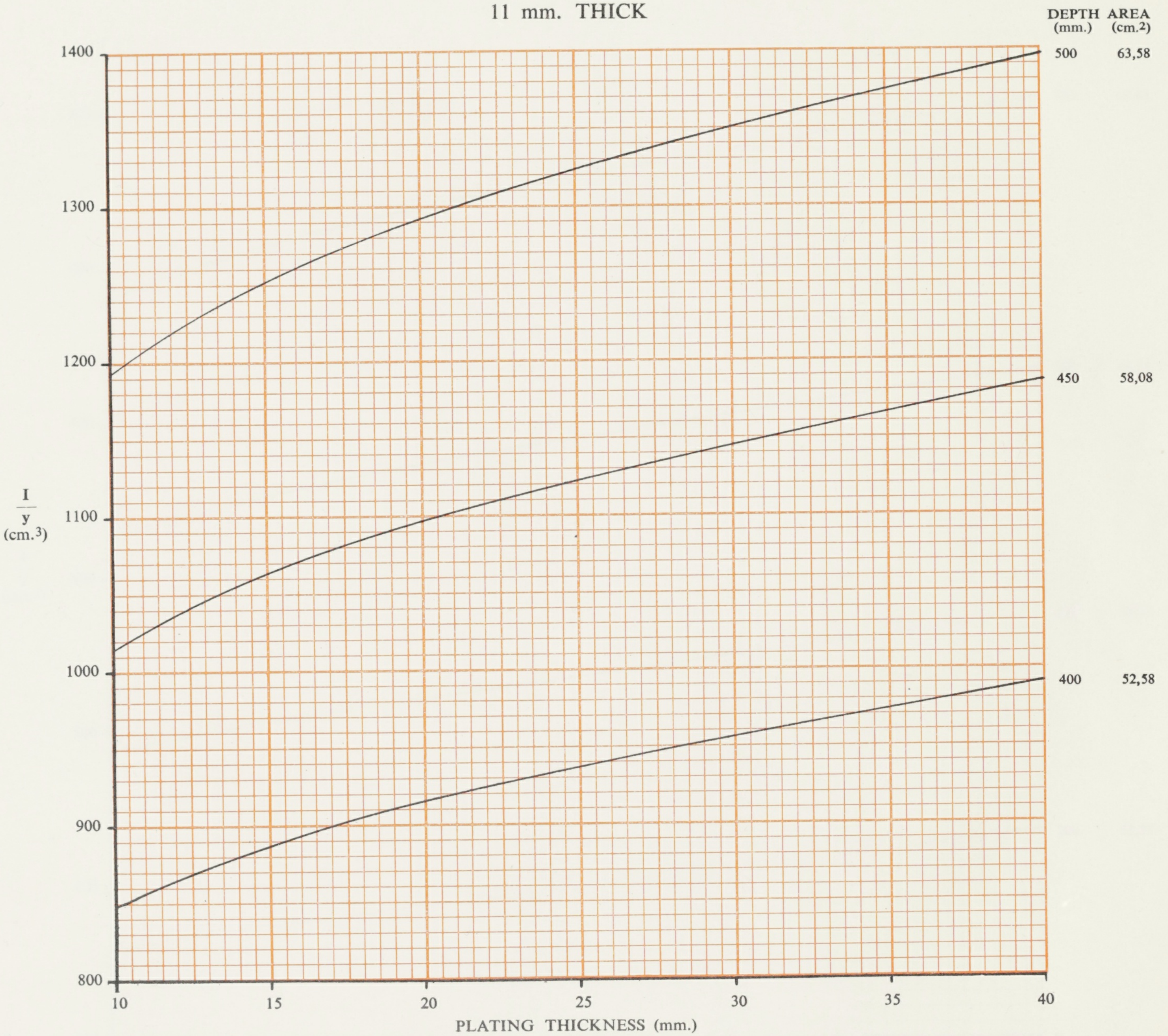
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



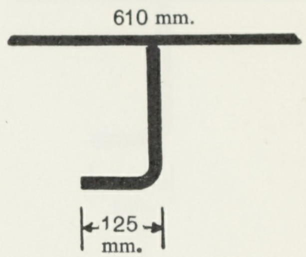
100 mm. FLANGE

11 mm. THICK



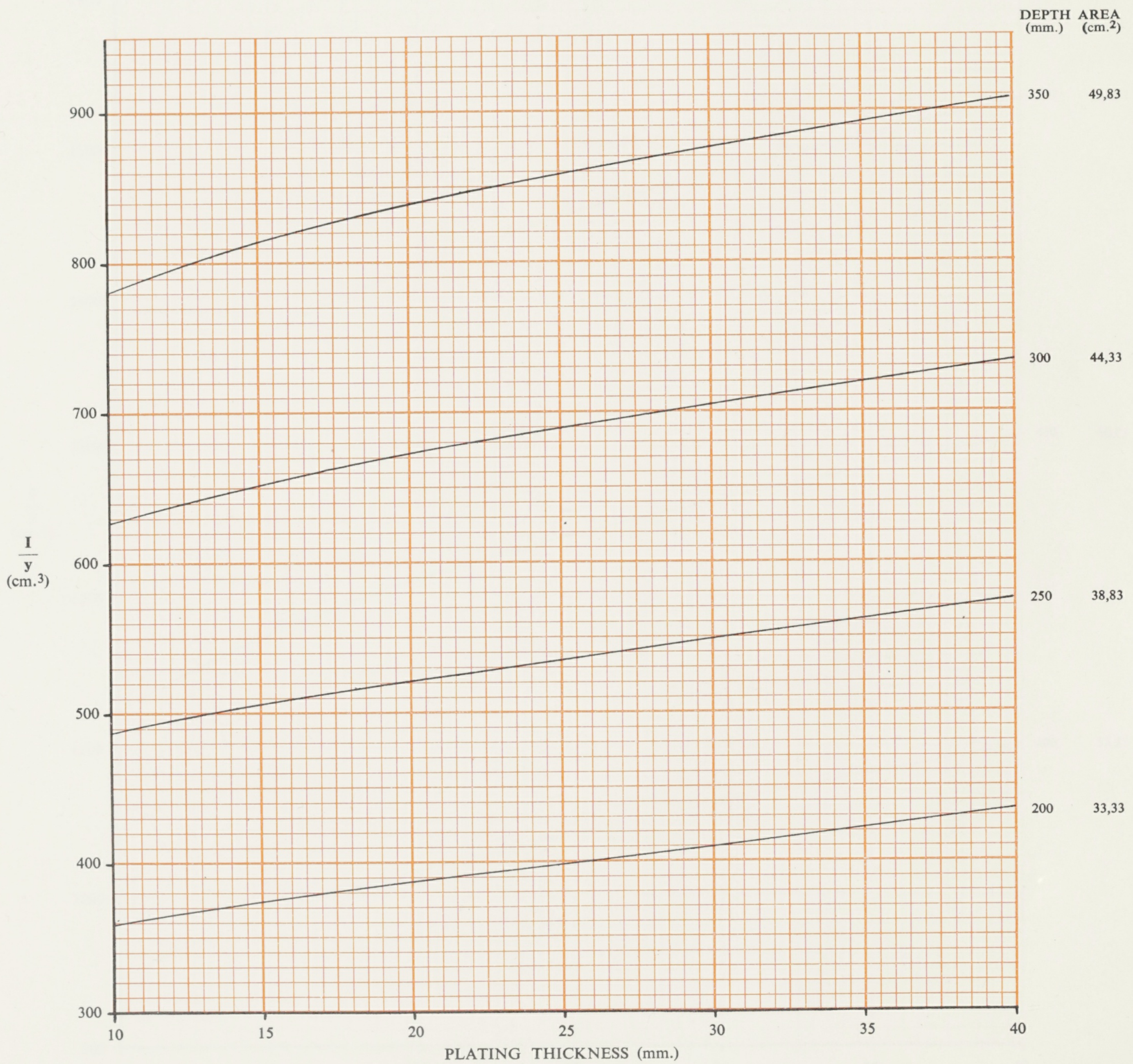
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



125 mm. FLANGE

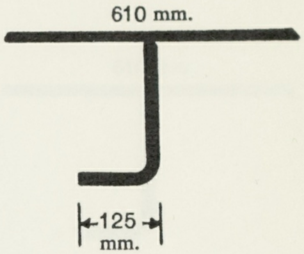
11 mm. THICK



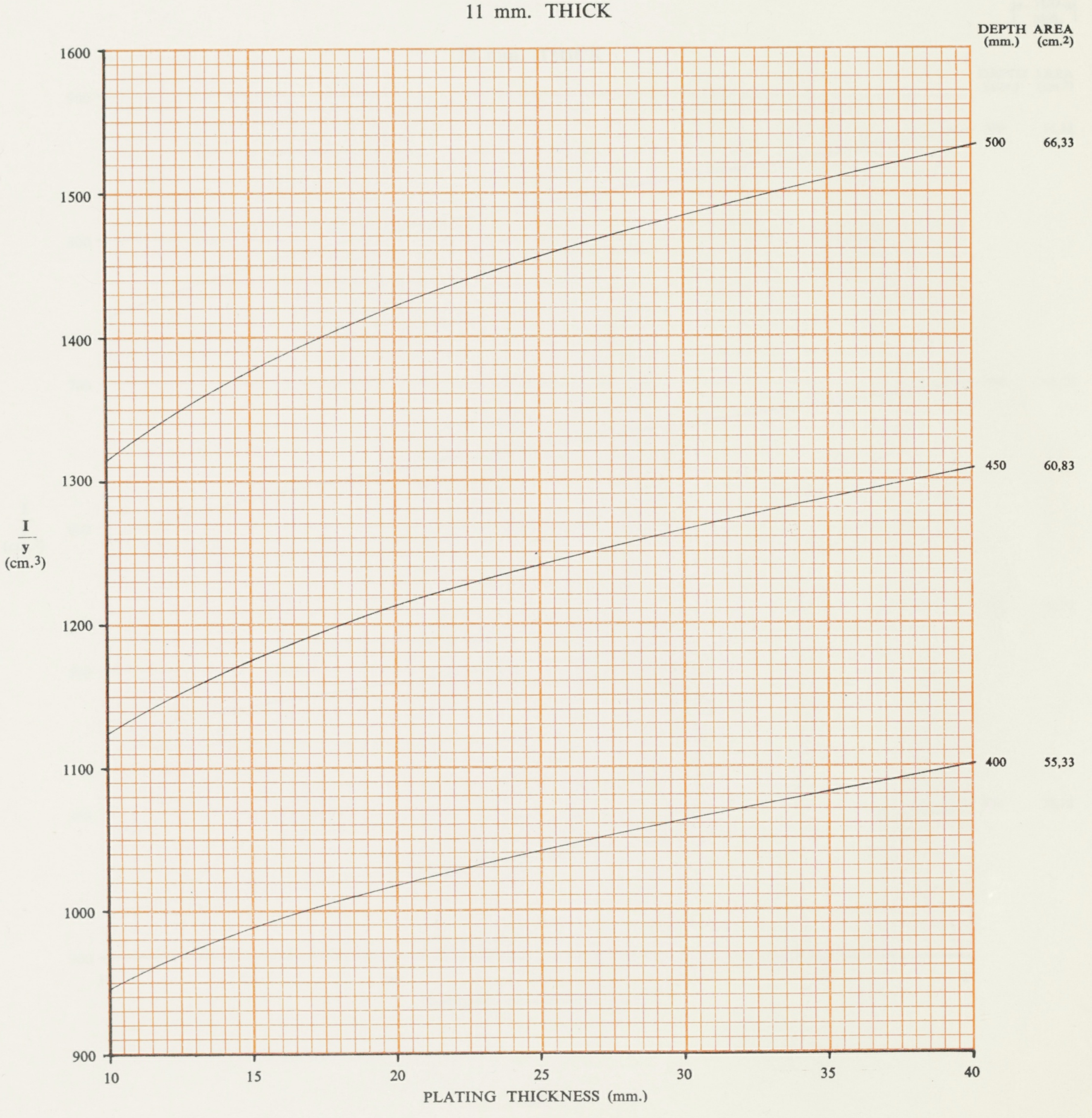
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

125 mm. FLANGE



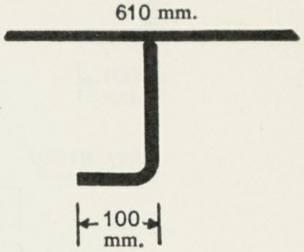
11 mm. THICK



3 F

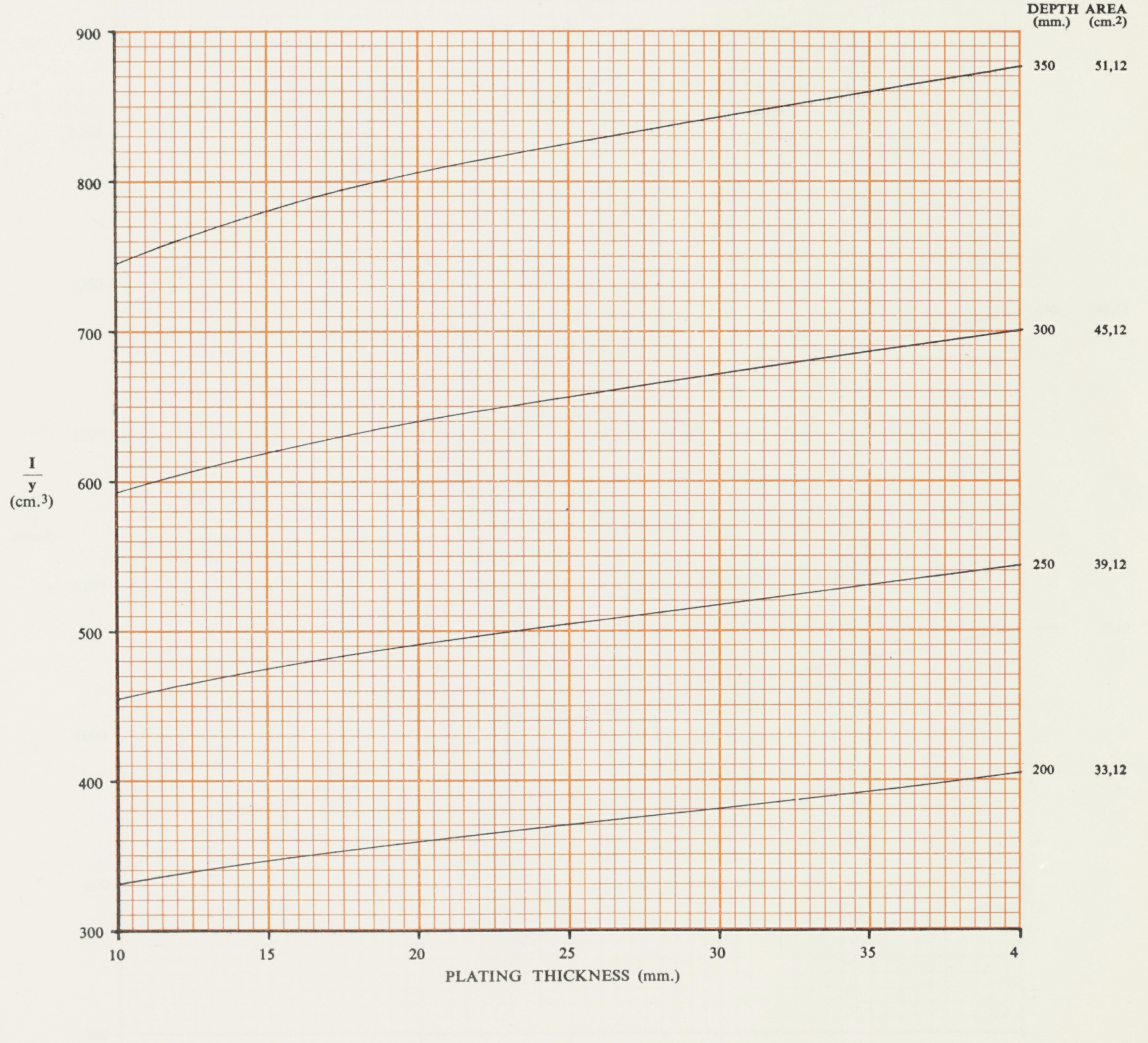
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



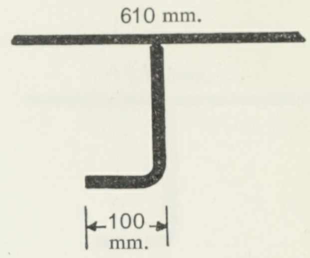
100 mm. FLANGE

12 mm. THICK



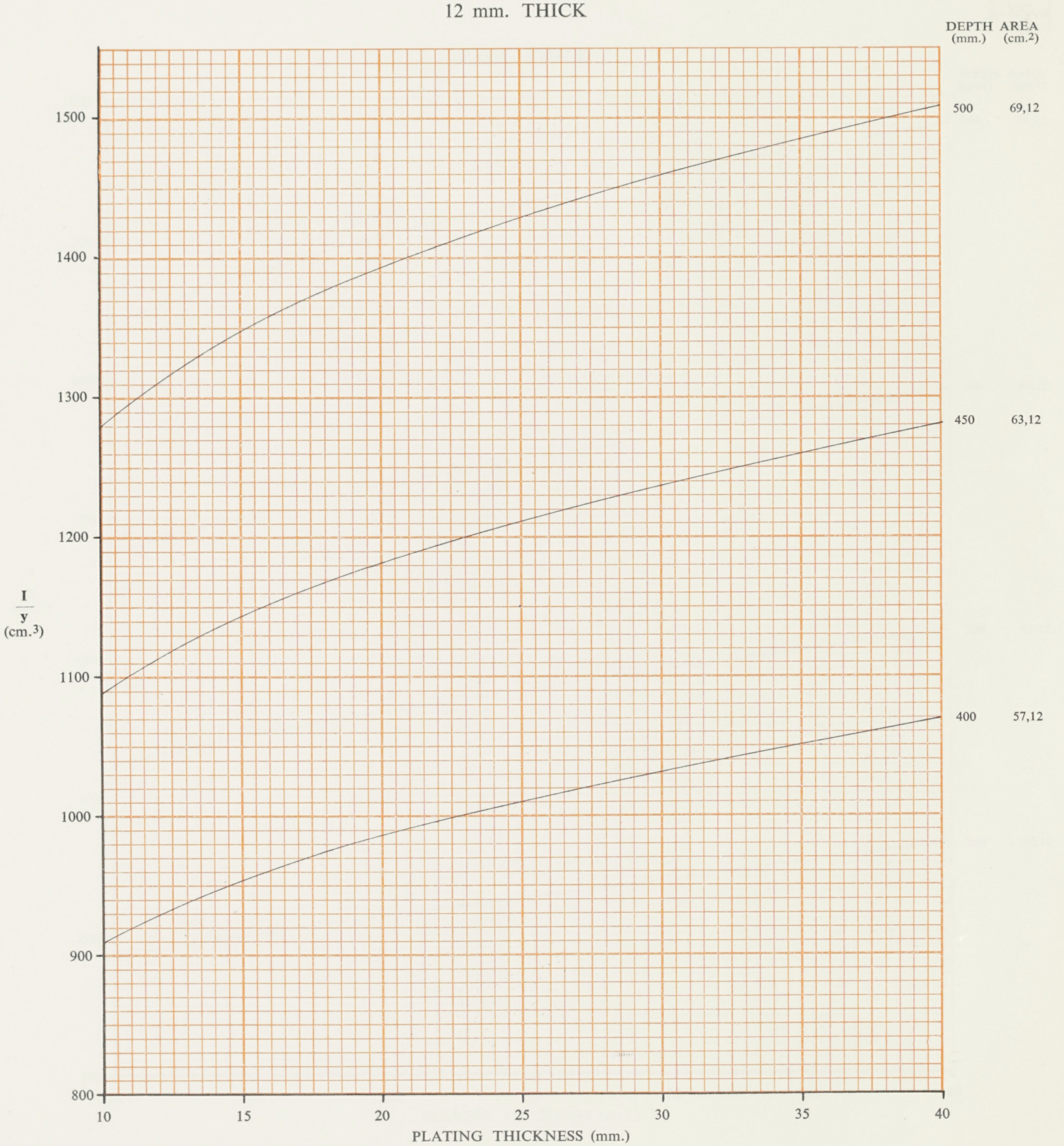
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



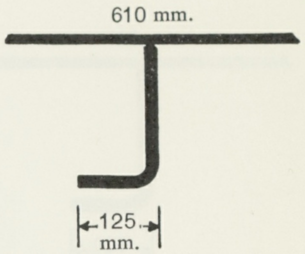
100 mm. FLANGE

12 mm. THICK



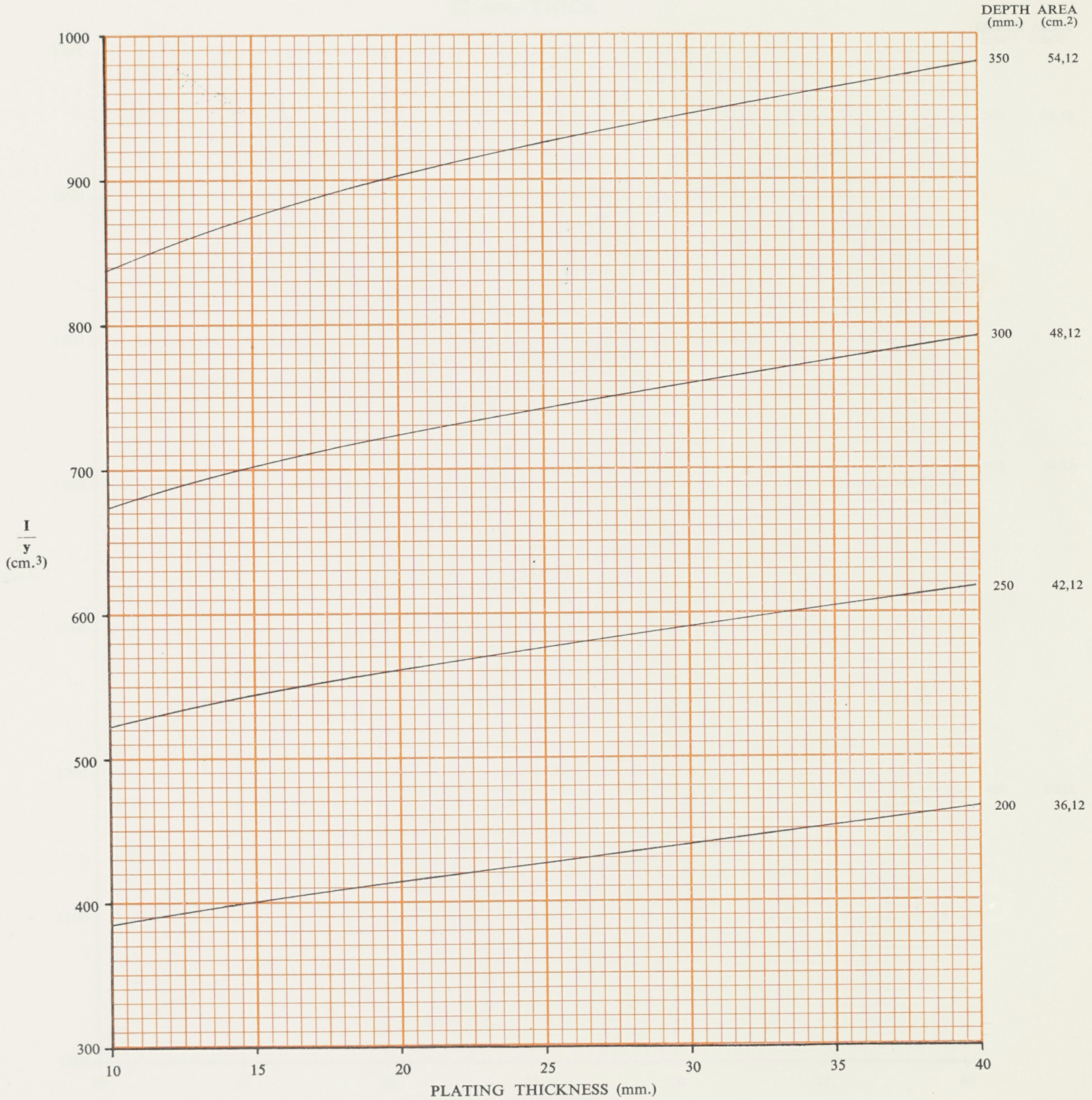
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



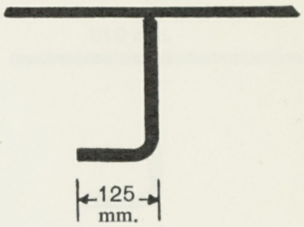
125 mm. FLANGE

12 mm. THICK



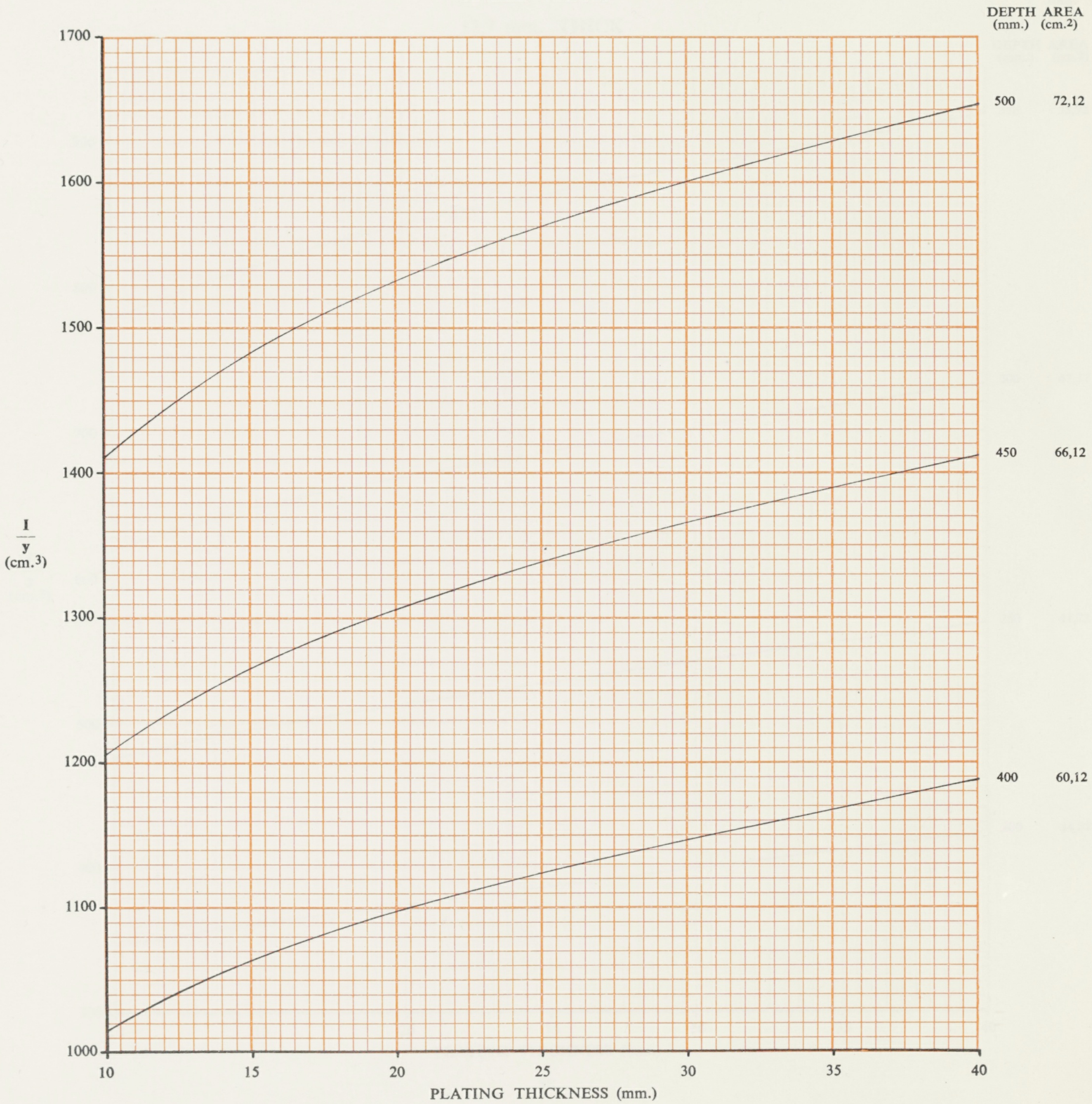
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



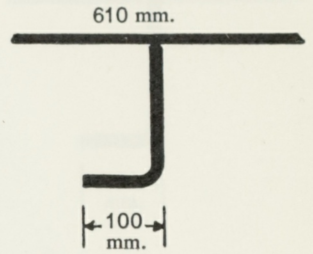
125 mm. FLANGE

12 mm. THICK



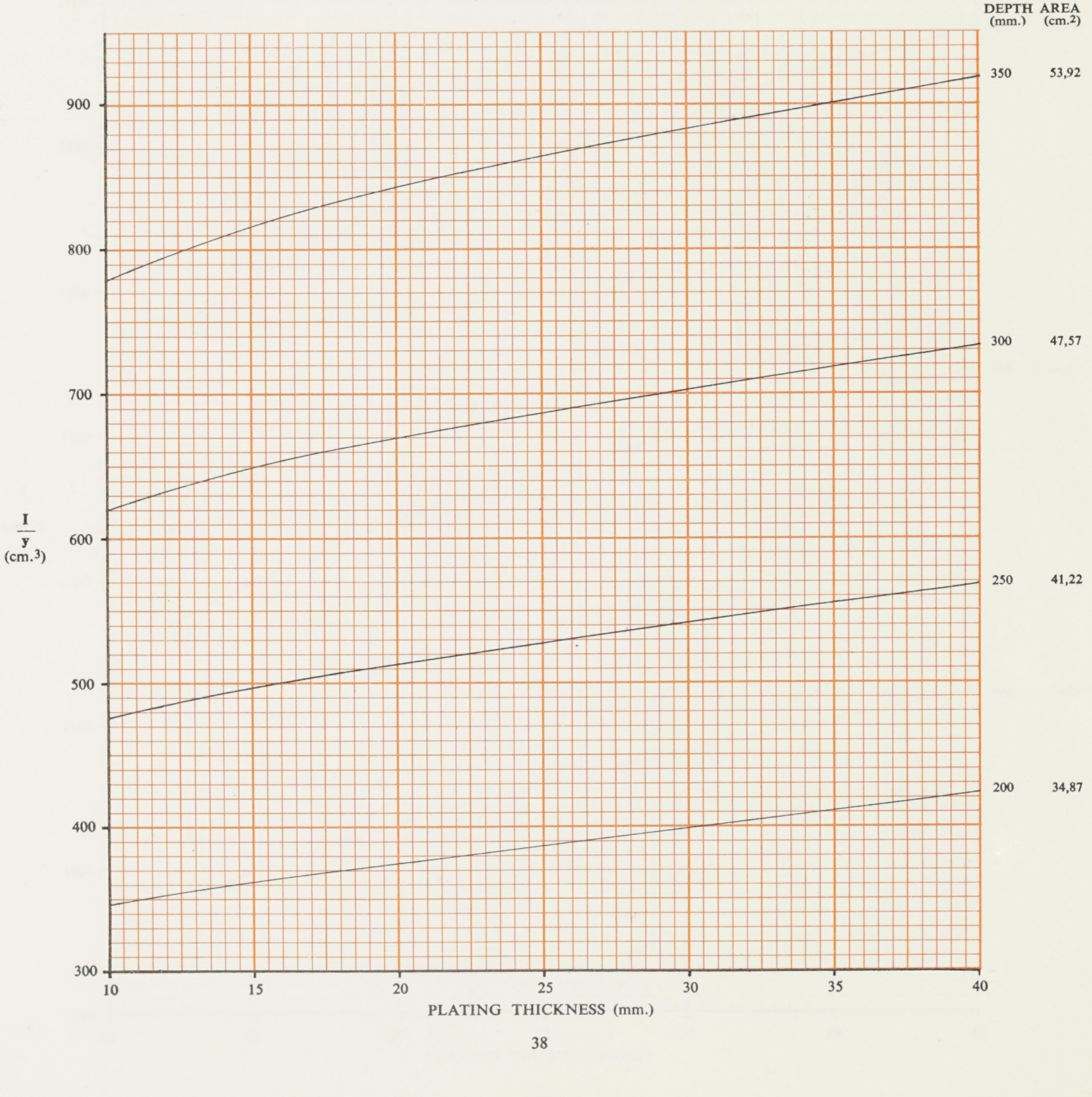
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



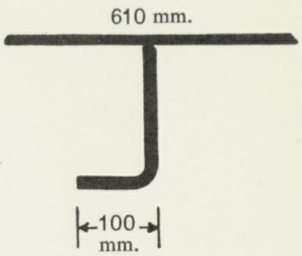
100 mm. FLANGE

12,7 mm. THICK



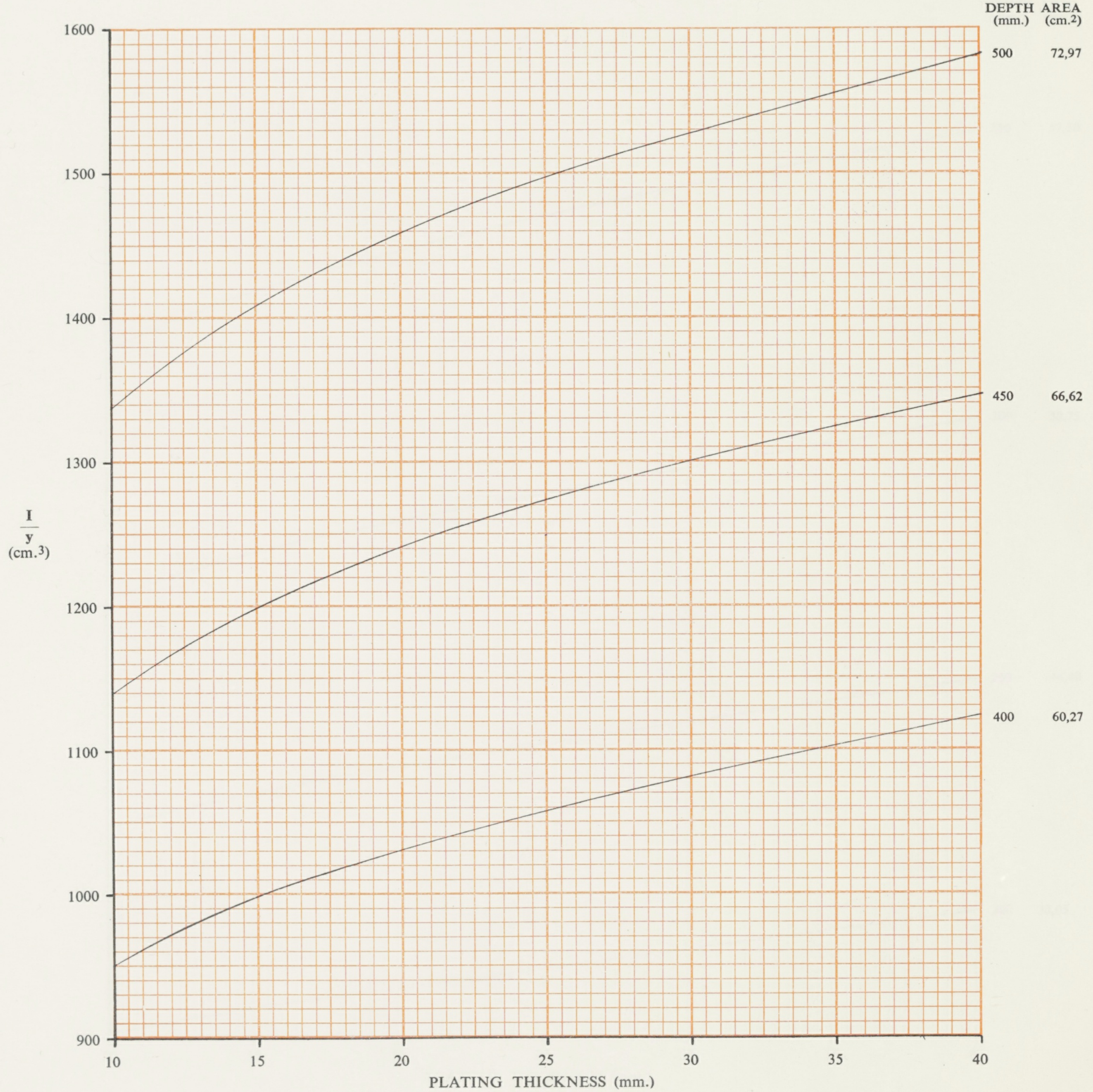
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



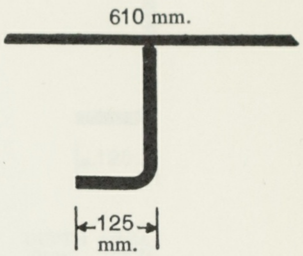
100 mm. FLANGE

12,7 mm. THICK



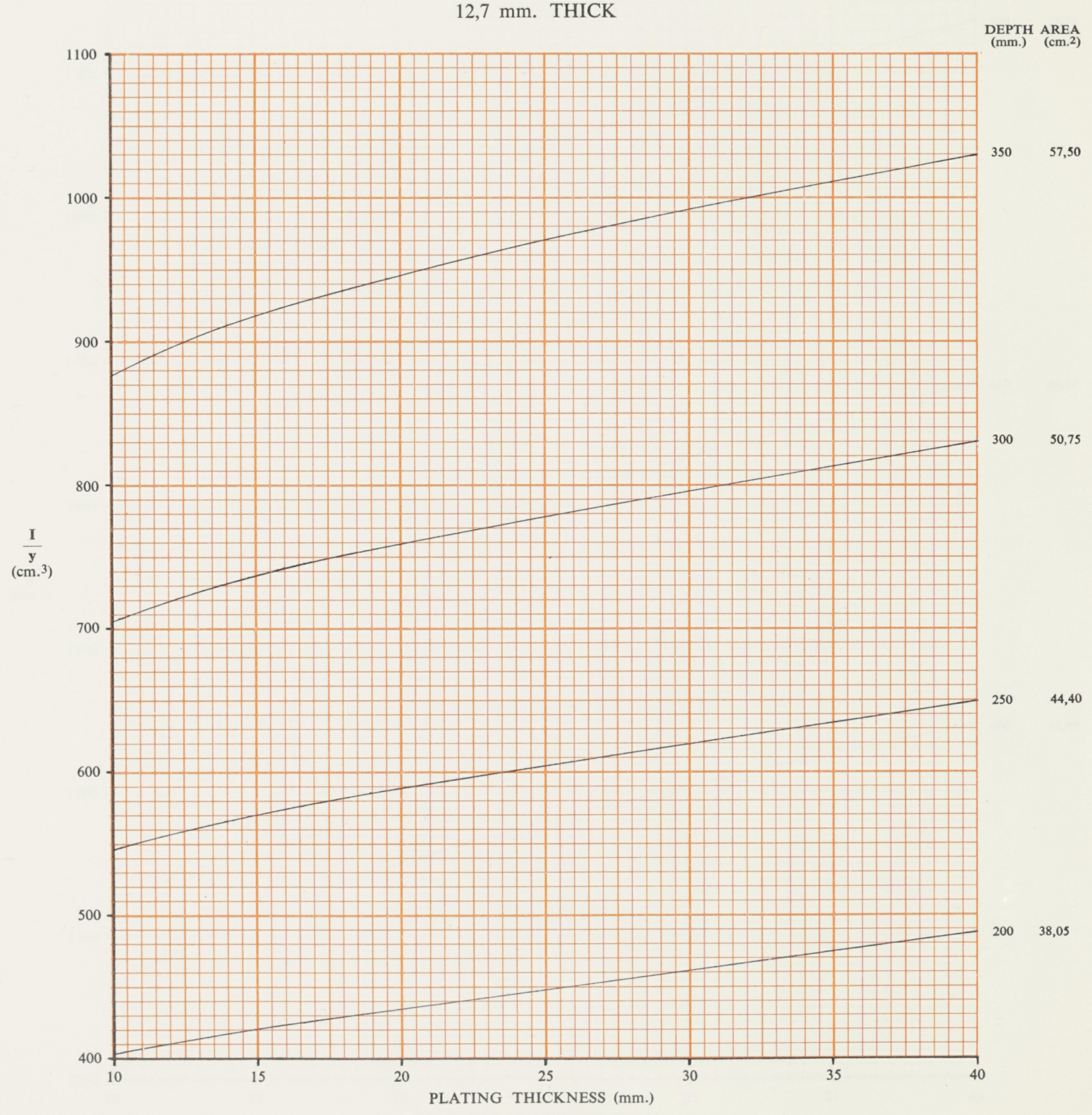
SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



125 mm. FLANGE

12,7 mm. THICK

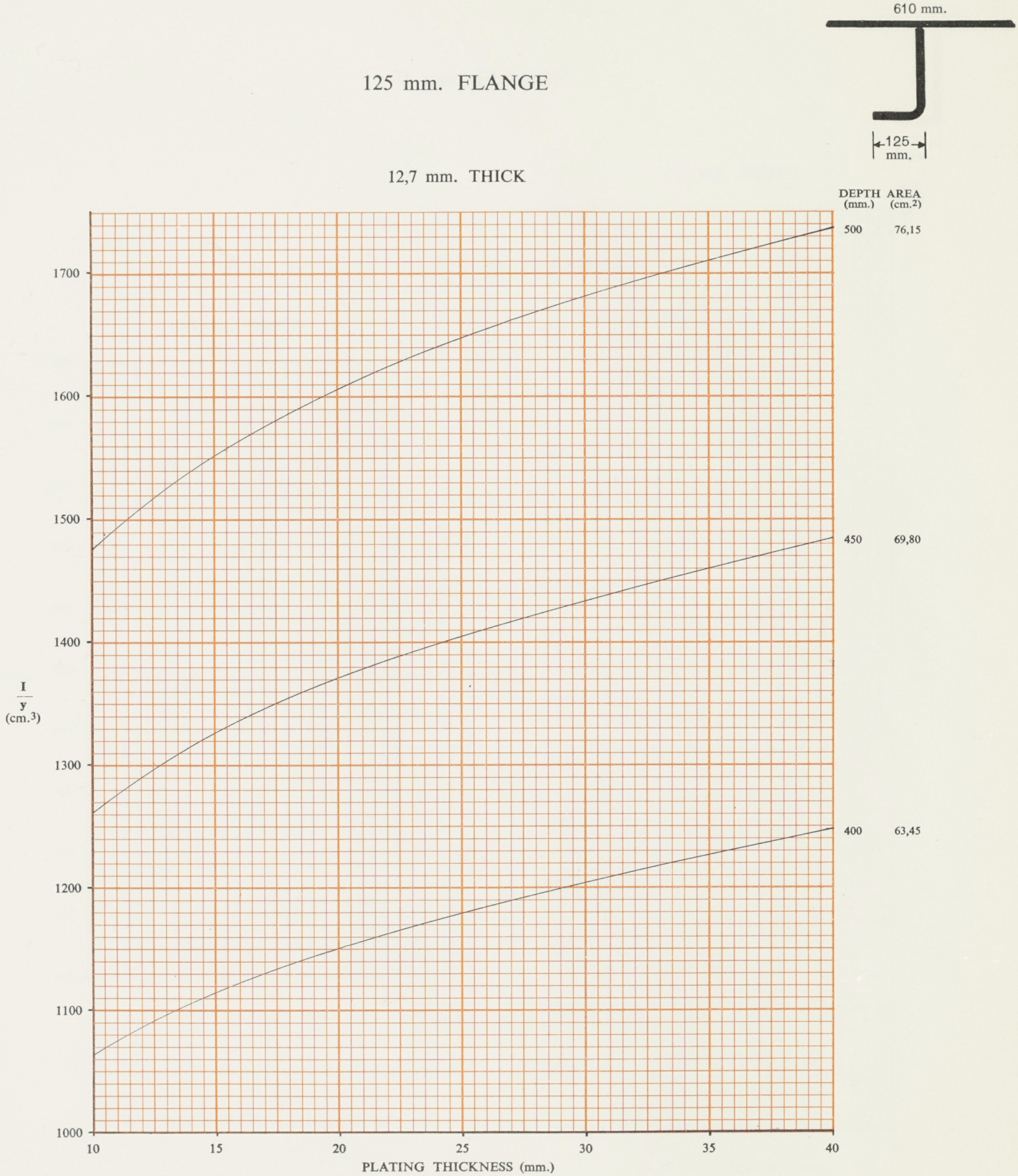


SECTION MODULUS AND AREA OF FLANGED PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

125 mm. FLANGE

12,7 mm. THICK

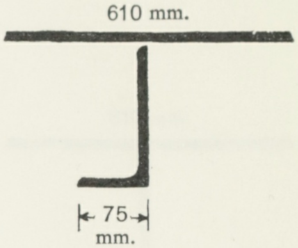


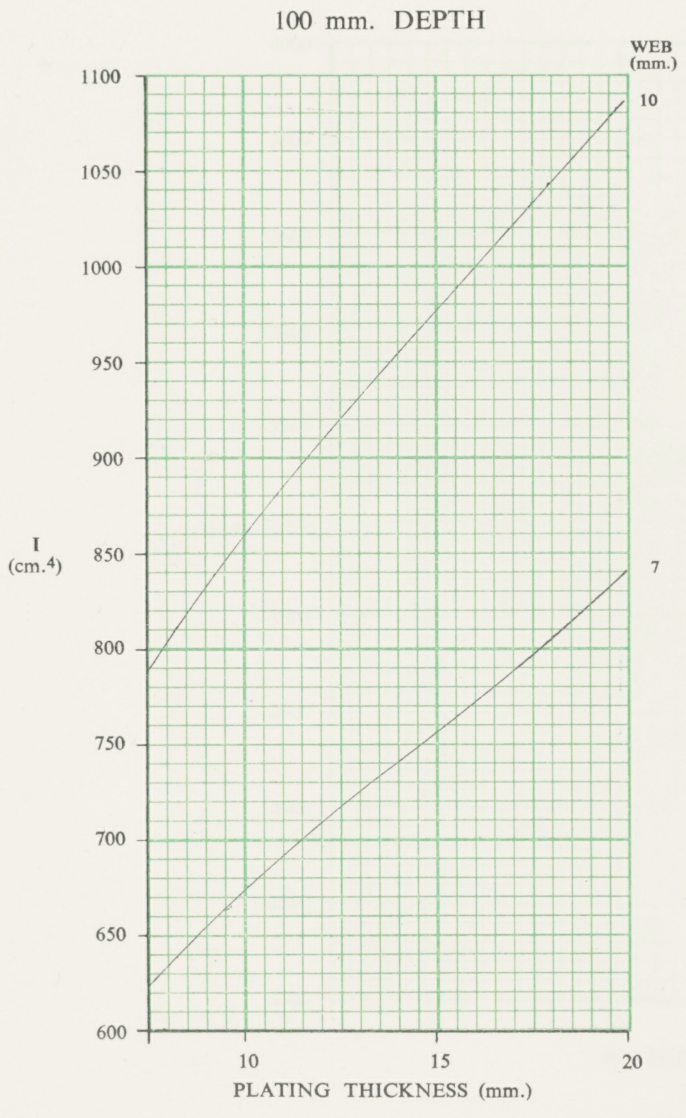
3 G

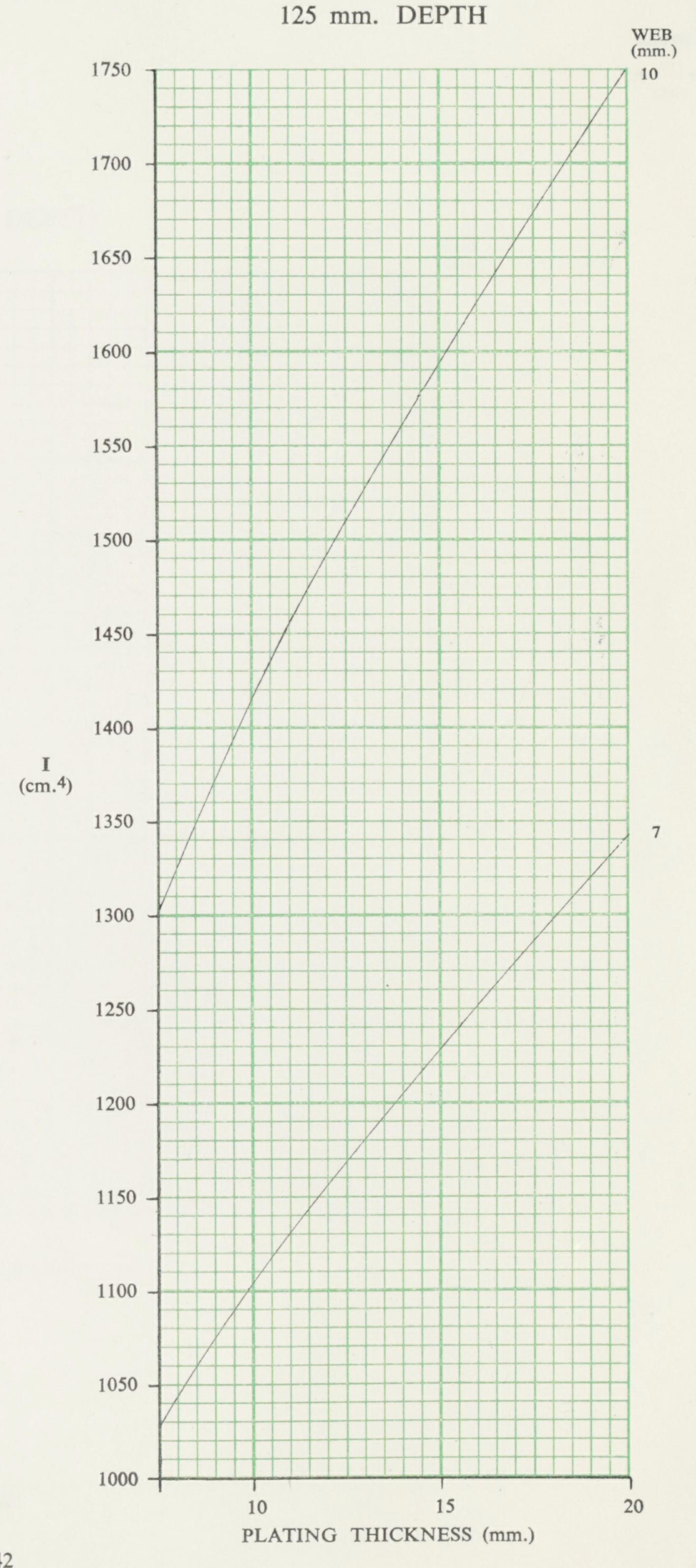
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

75 mm. FLANGE

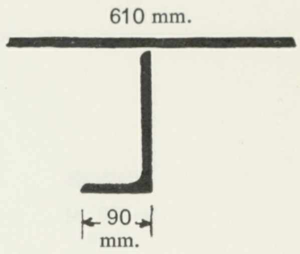






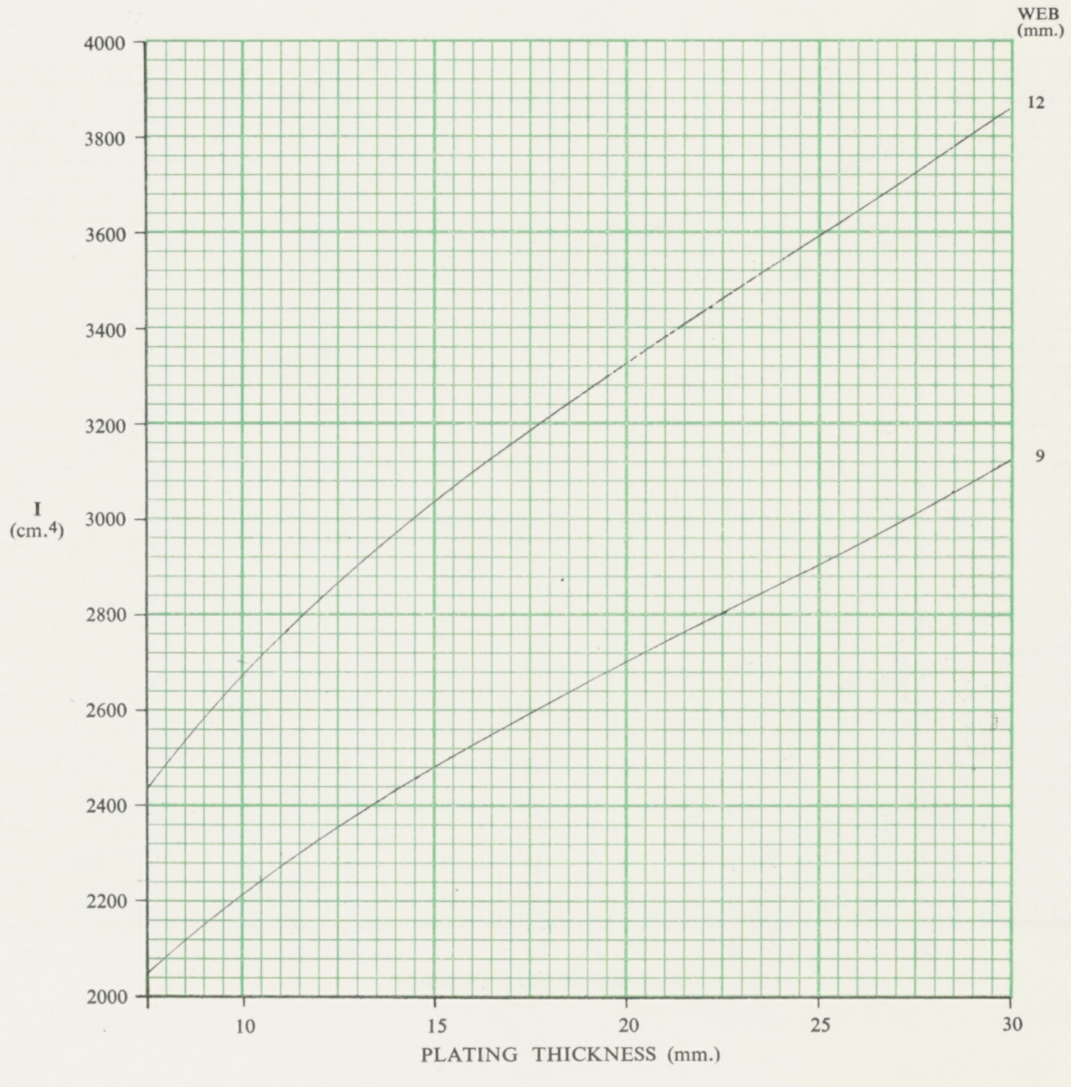
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)



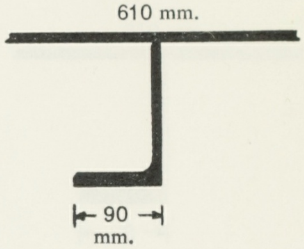
90 mm. FLANGE

150 mm. DEPTH

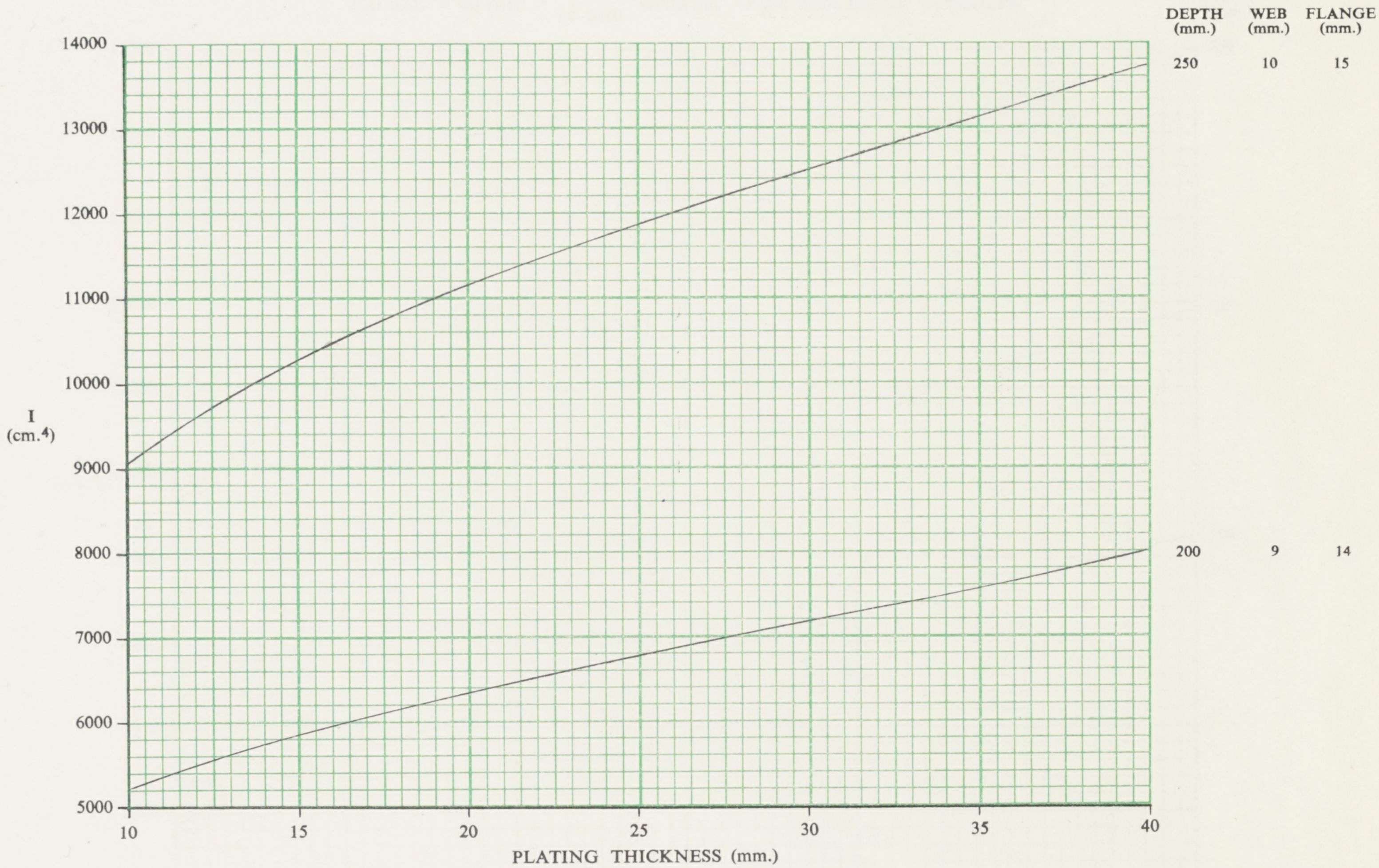


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

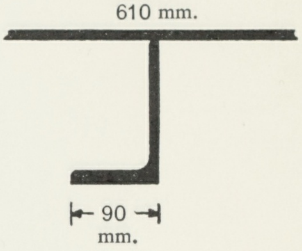


90 mm. FLANGE

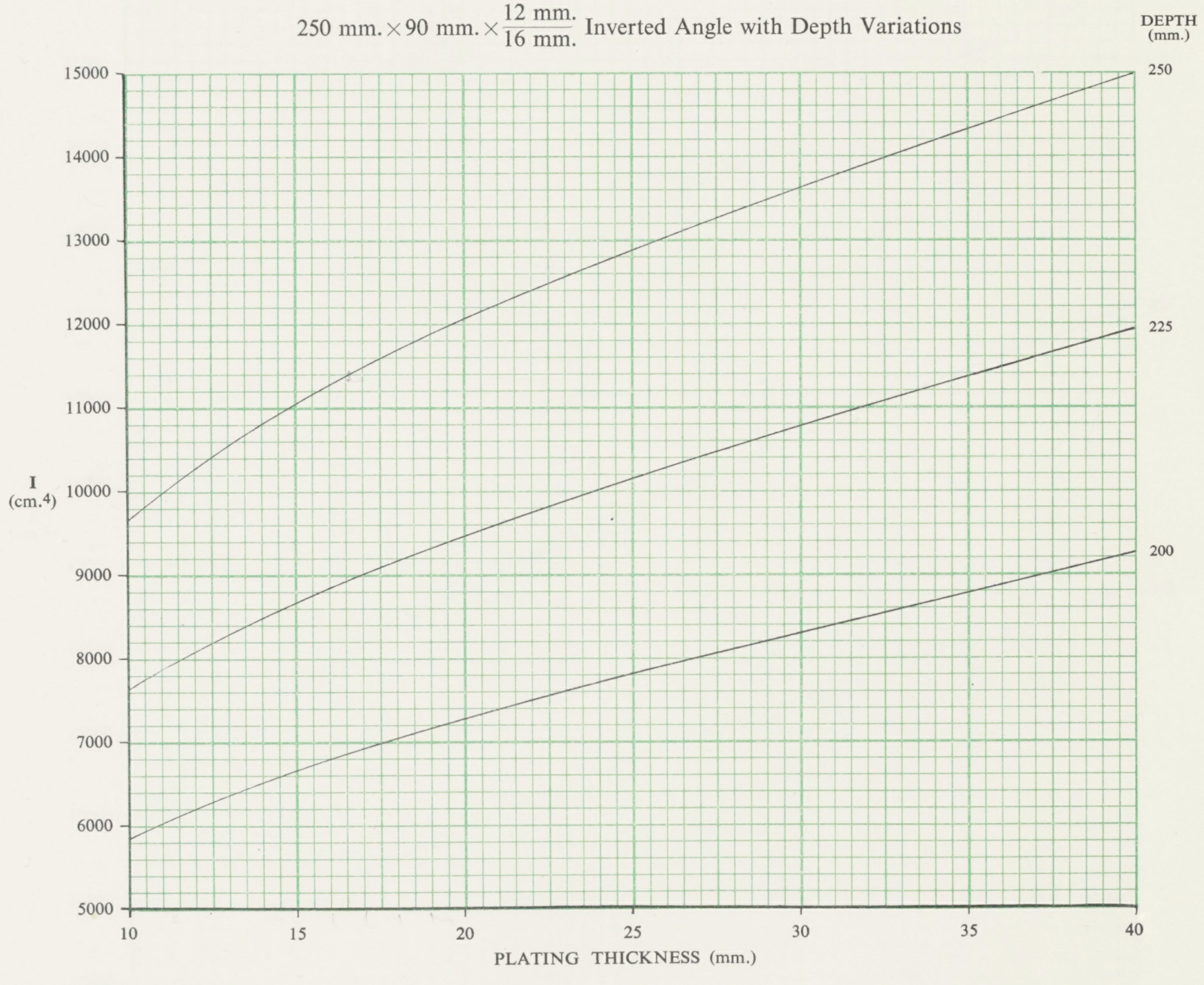


MOMENT OF INERTIA OF INVERTED ANGLES

WITH PLATING)

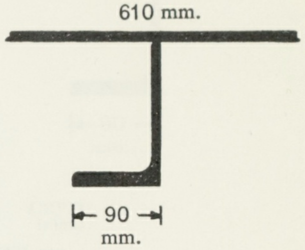


$250 \text{ mm.} \times 90 \text{ mm.} \times \frac{12 \text{ mm.}}{16 \text{ mm.}}$ Inverted Angle with Depth Variations

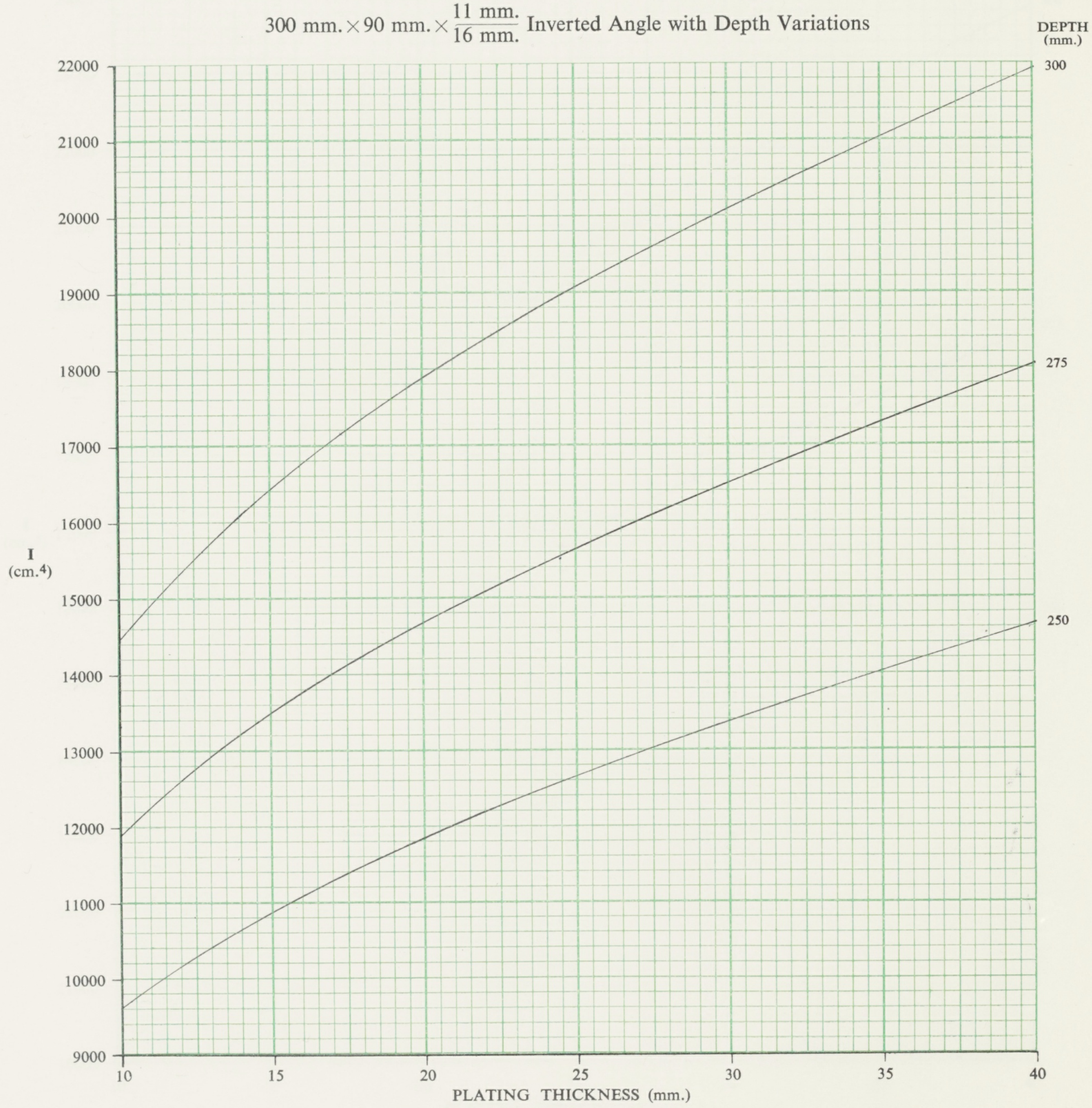


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

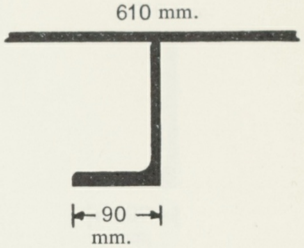


300 mm. $\times$ 90 mm. $\times \frac{11 \text{ mm.}}{16 \text{ mm.}}$ Inverted Angle with Depth Variations

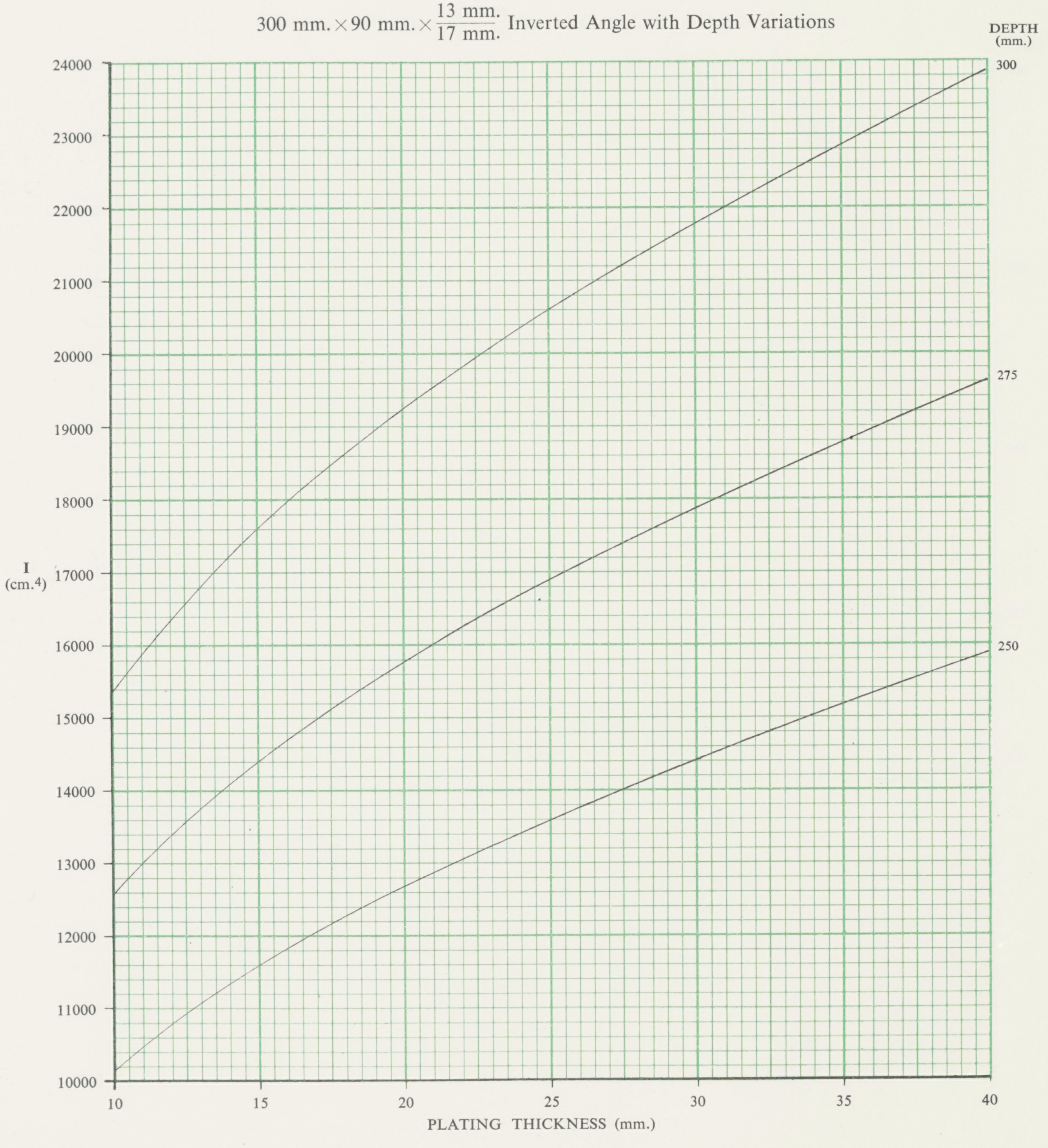


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)



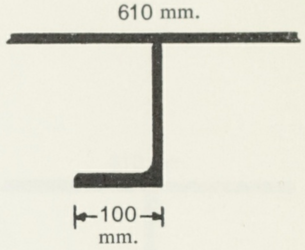
300 mm. $\times$ 90 mm. $\times \frac{13 \text{ mm.}}{17 \text{ mm.}}$ Inverted Angle with Depth Variations



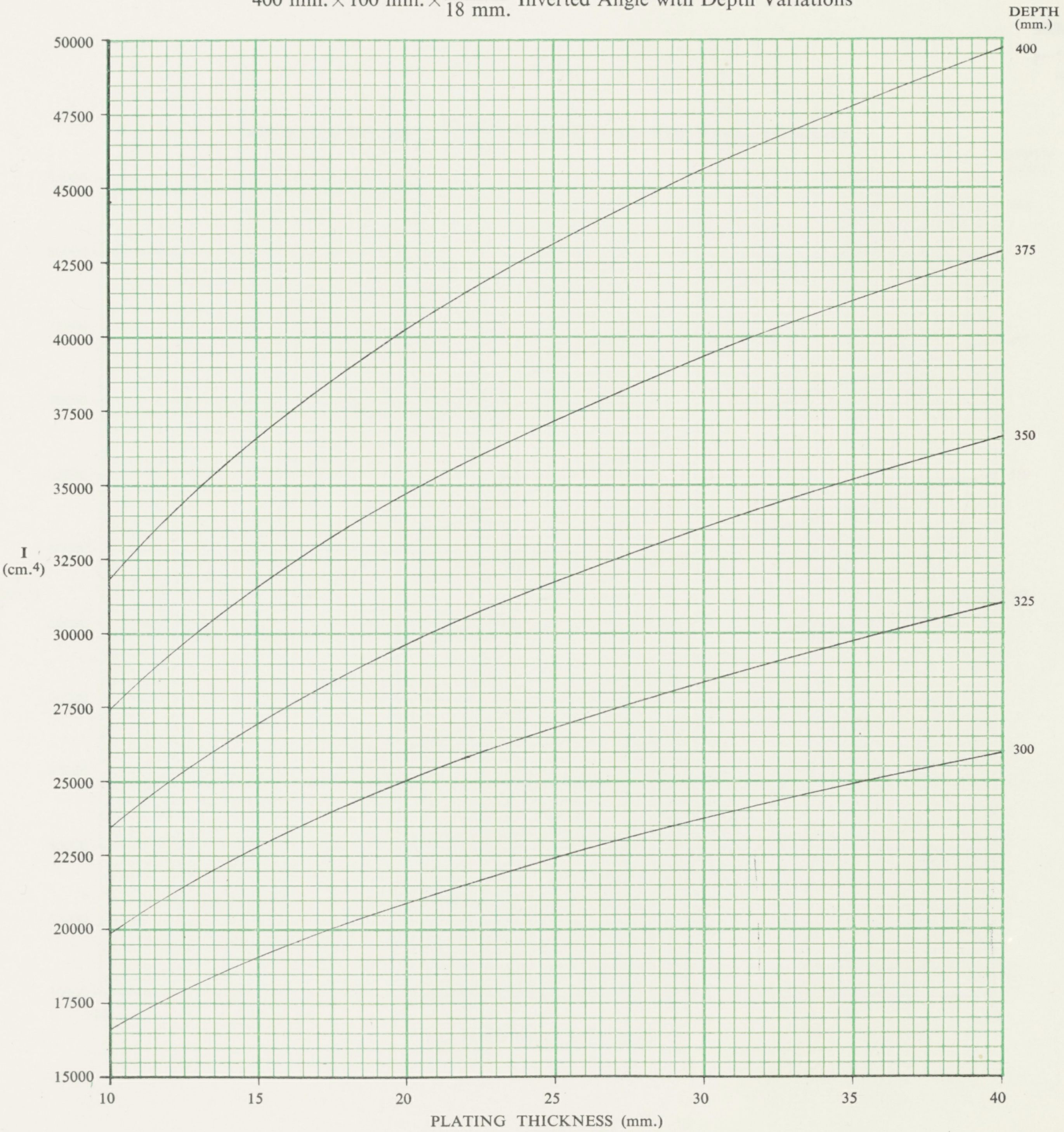
3 J

MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

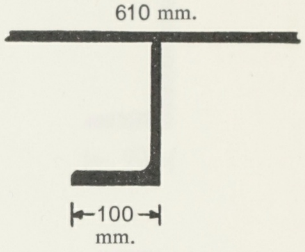


400 mm. × 100 mm. × $\frac{13 \text{ mm.}}{18 \text{ mm.}}$ Inverted Angle with Depth Variations

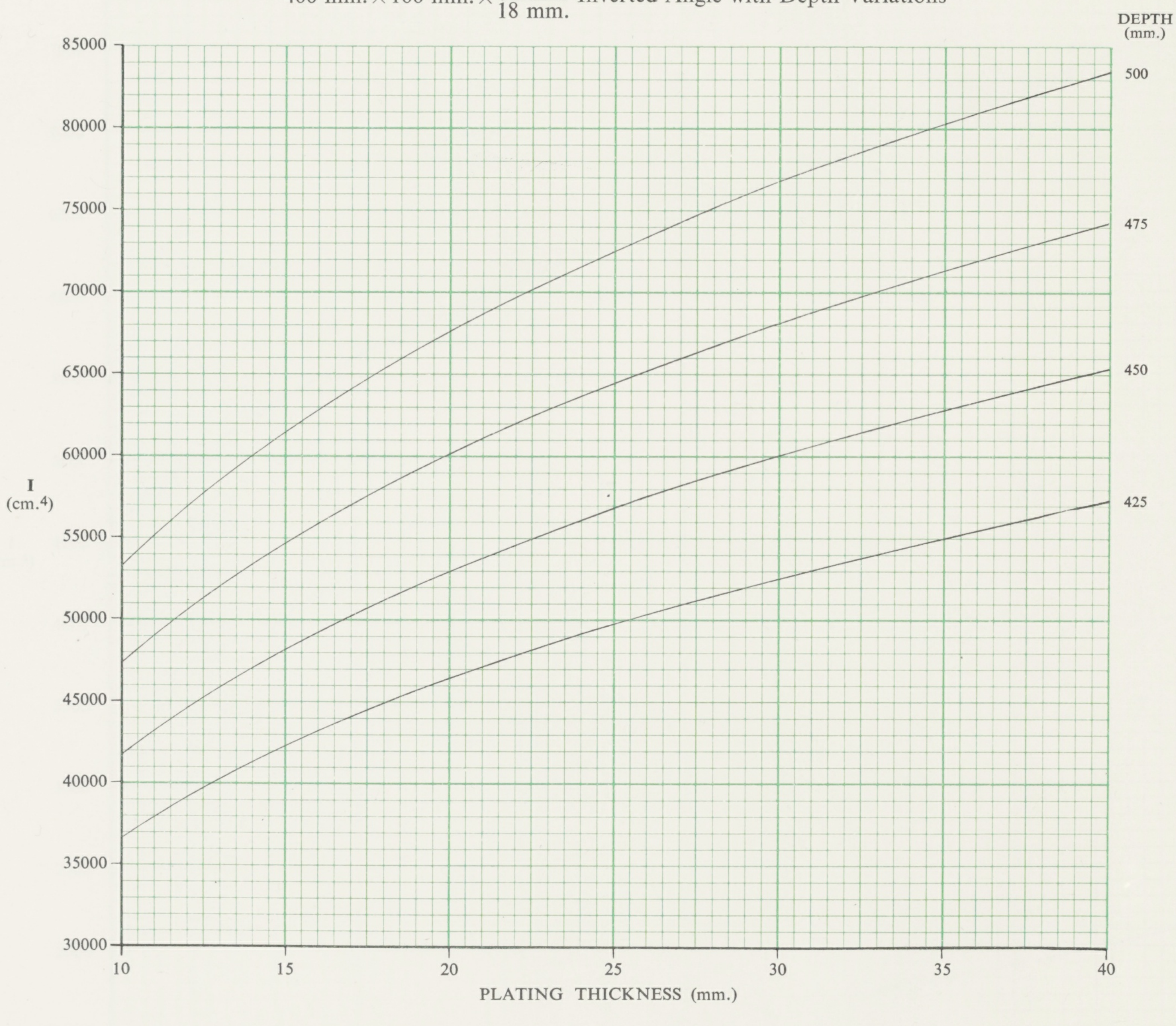


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

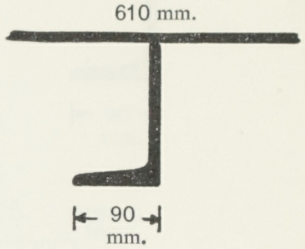


400 mm. × 100 mm. × $\frac{13\text{ mm.}}{18\text{ mm.}}$ Inverted Angle with Depth Variations

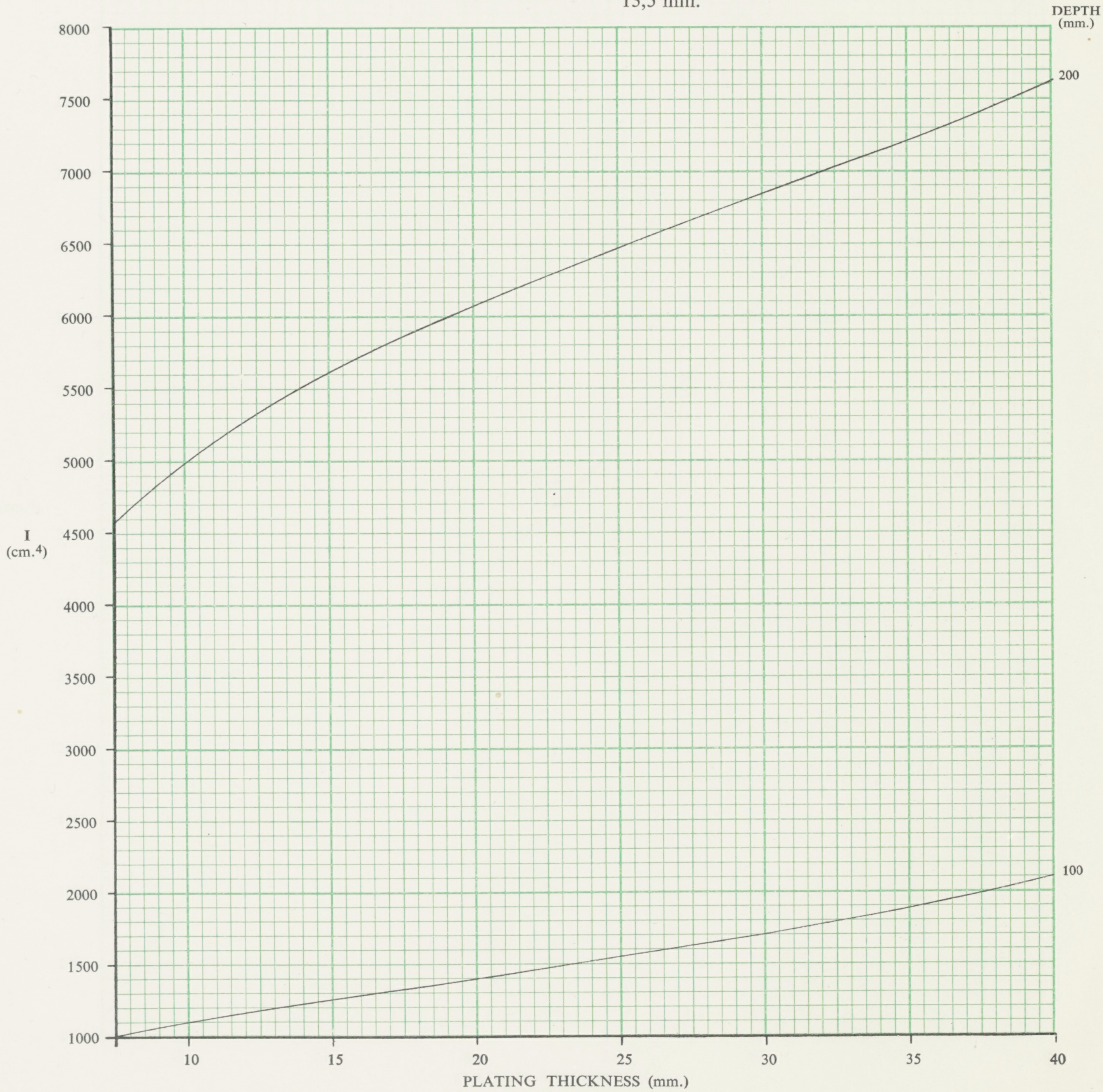


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

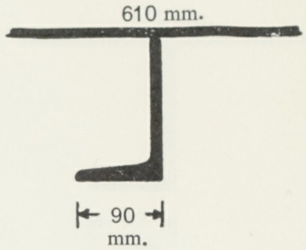


Cut from 200 mm. $\times$ 90 mm. $\times \frac{8 \text{ mm.}}{13{,}5 \text{ mm.}}$ Channel

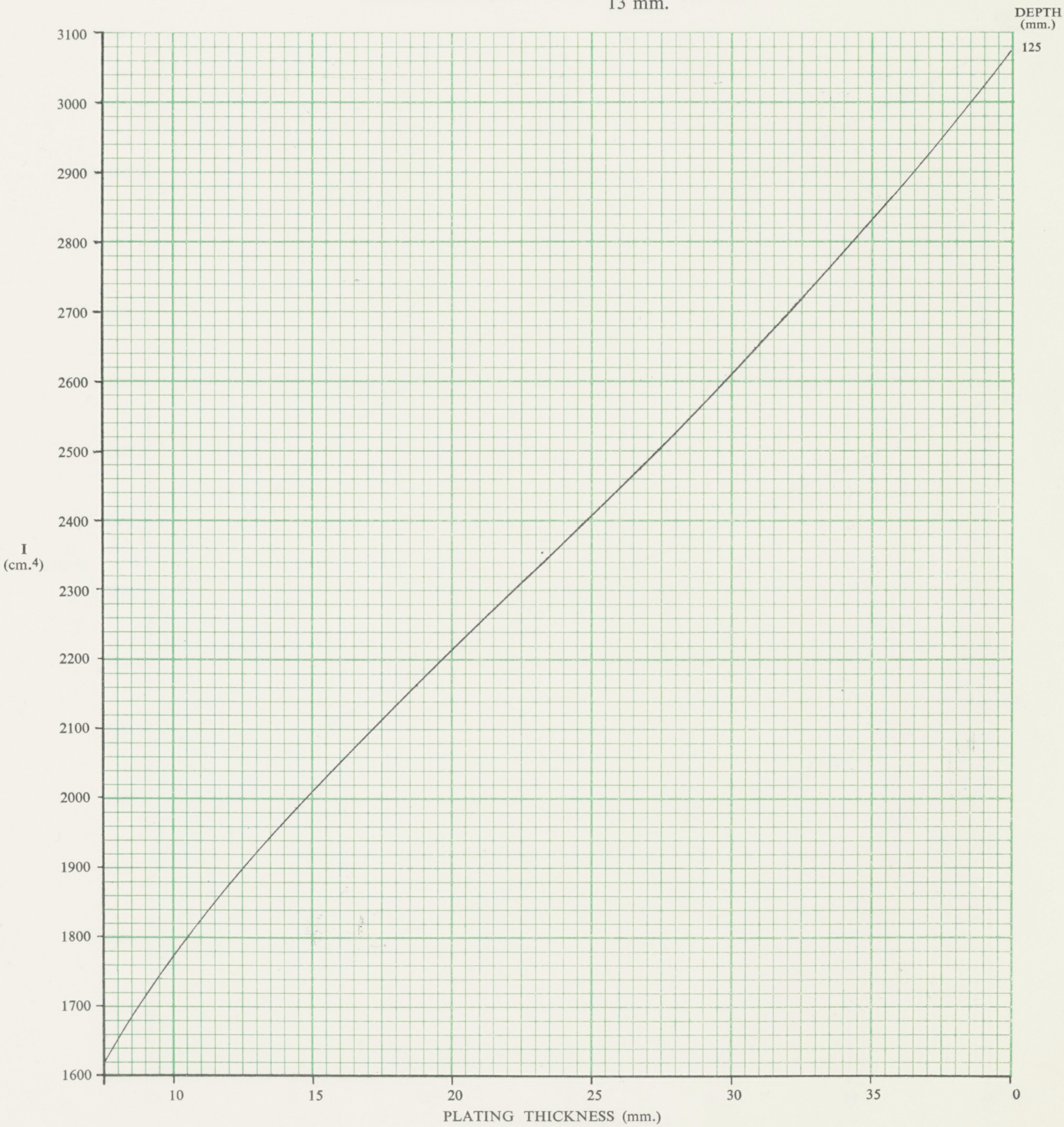


MOMENT OF INERTIA OF INVERTED ANGLES

WITH PLATING)

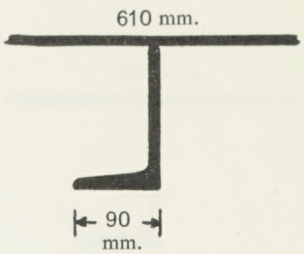


Cut from 250 mm. $\times$ 90 mm. $\times \frac{9 \text{ mm.}}{13 \text{ mm.}}$ Channel

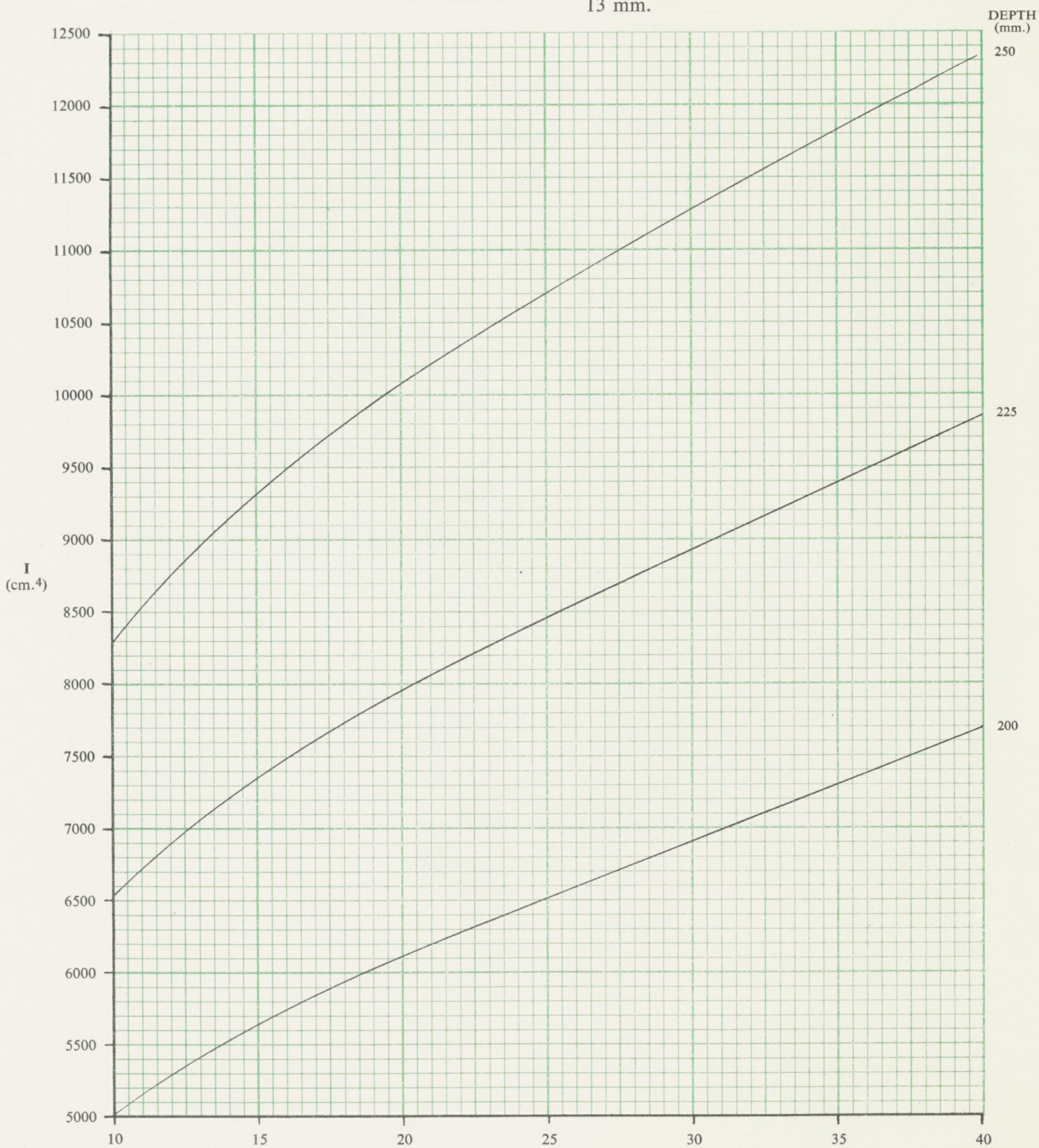


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

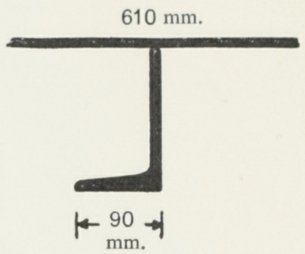


Cut from 250 mm. × 90 mm. × $\frac{9 \text{ mm.}}{13 \text{ mm.}}$ Channel

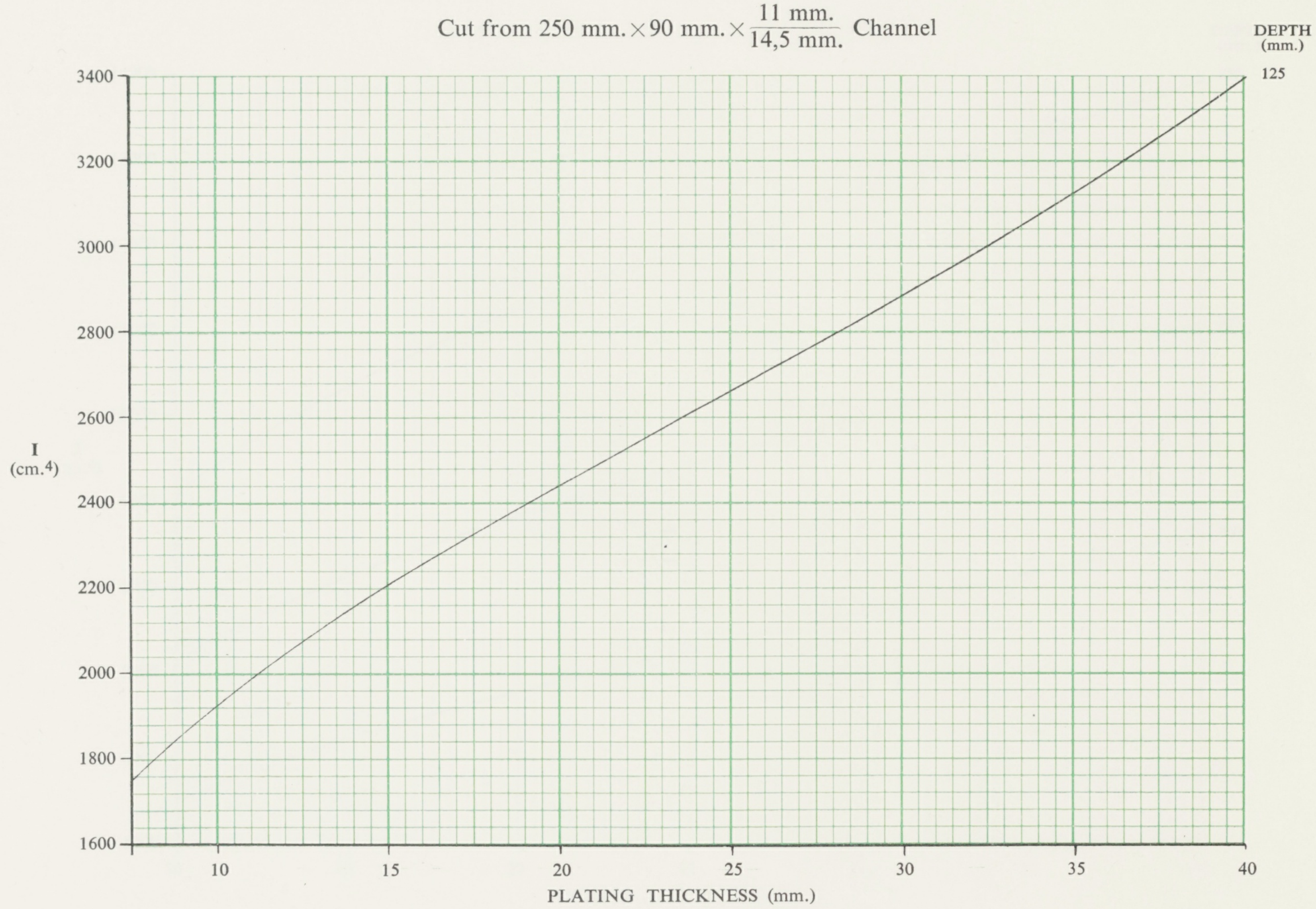


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

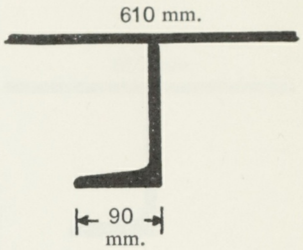


Cut from 250 mm. $\times$ 90 mm. $\times \frac{11 \text{ mm.}}{14{,}5 \text{ mm.}}$ Channel

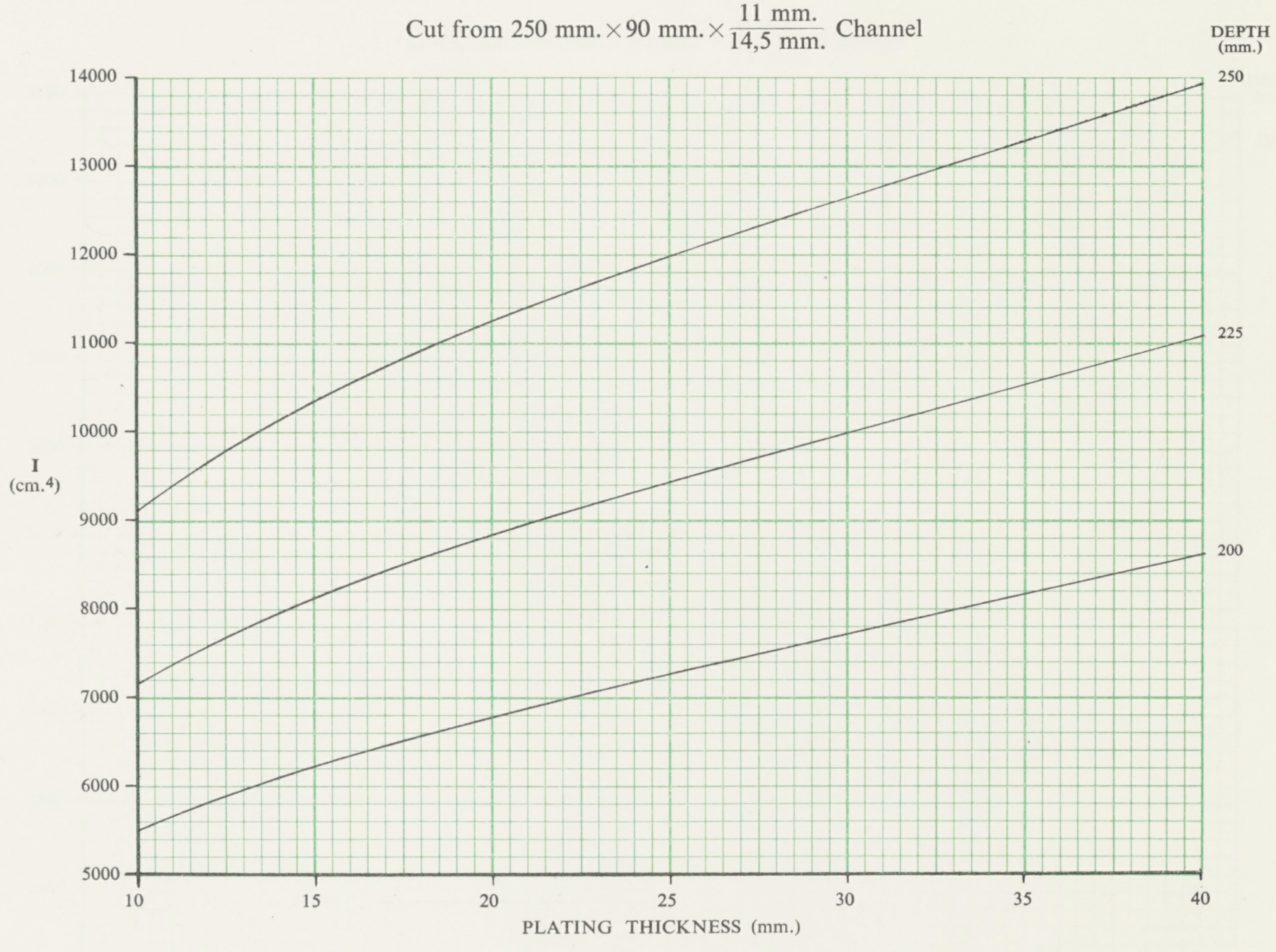


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

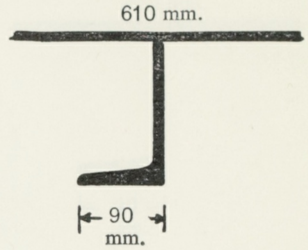


Cut from 250 mm. × 90 mm. × $\frac{11 \text{ mm.}}{14{,}5 \text{ mm.}}$ Channel

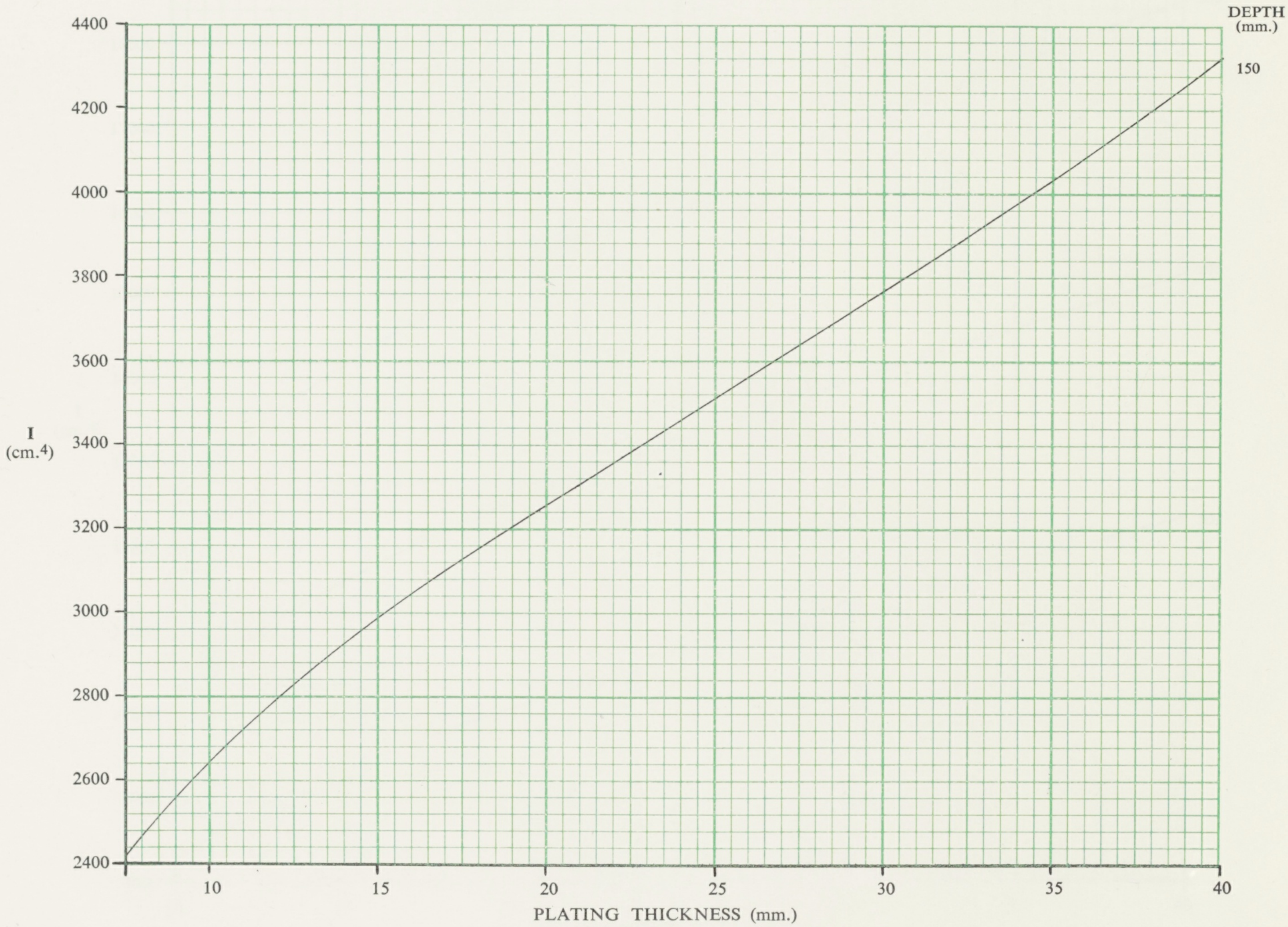


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)



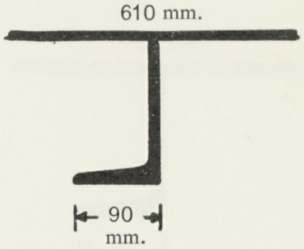
Cut from 300 mm. × 90 mm. × $\frac{9 \text{ mm.}}{13 \text{ mm.}}$ Channel



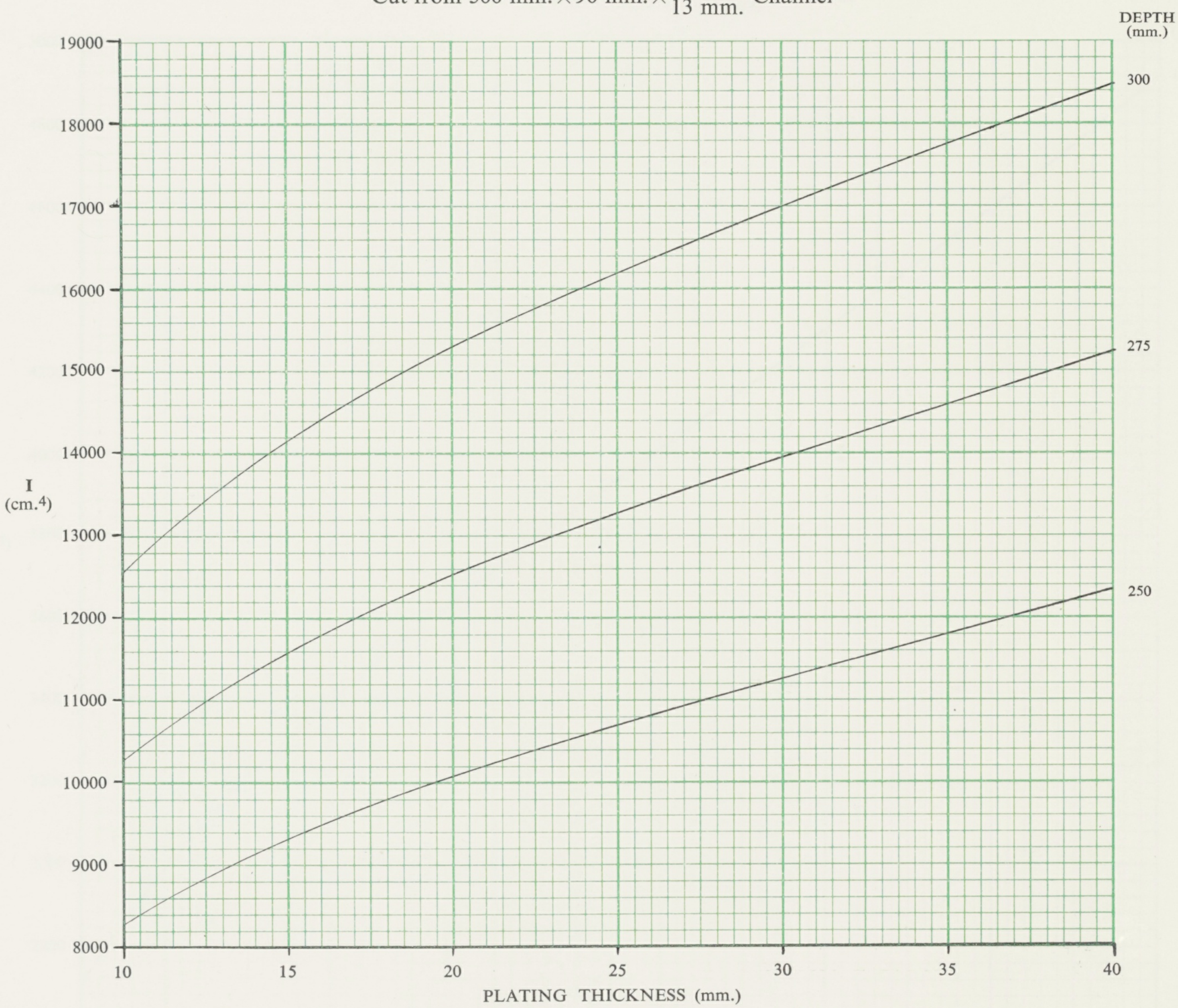
3 K

MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

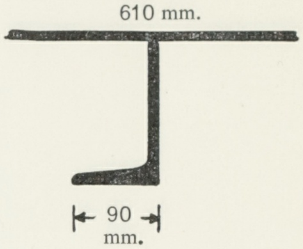


Cut from 300 mm. $\times$ 90 mm. $\times \frac{9 \text{ mm.}}{13 \text{ mm.}}$ Channel

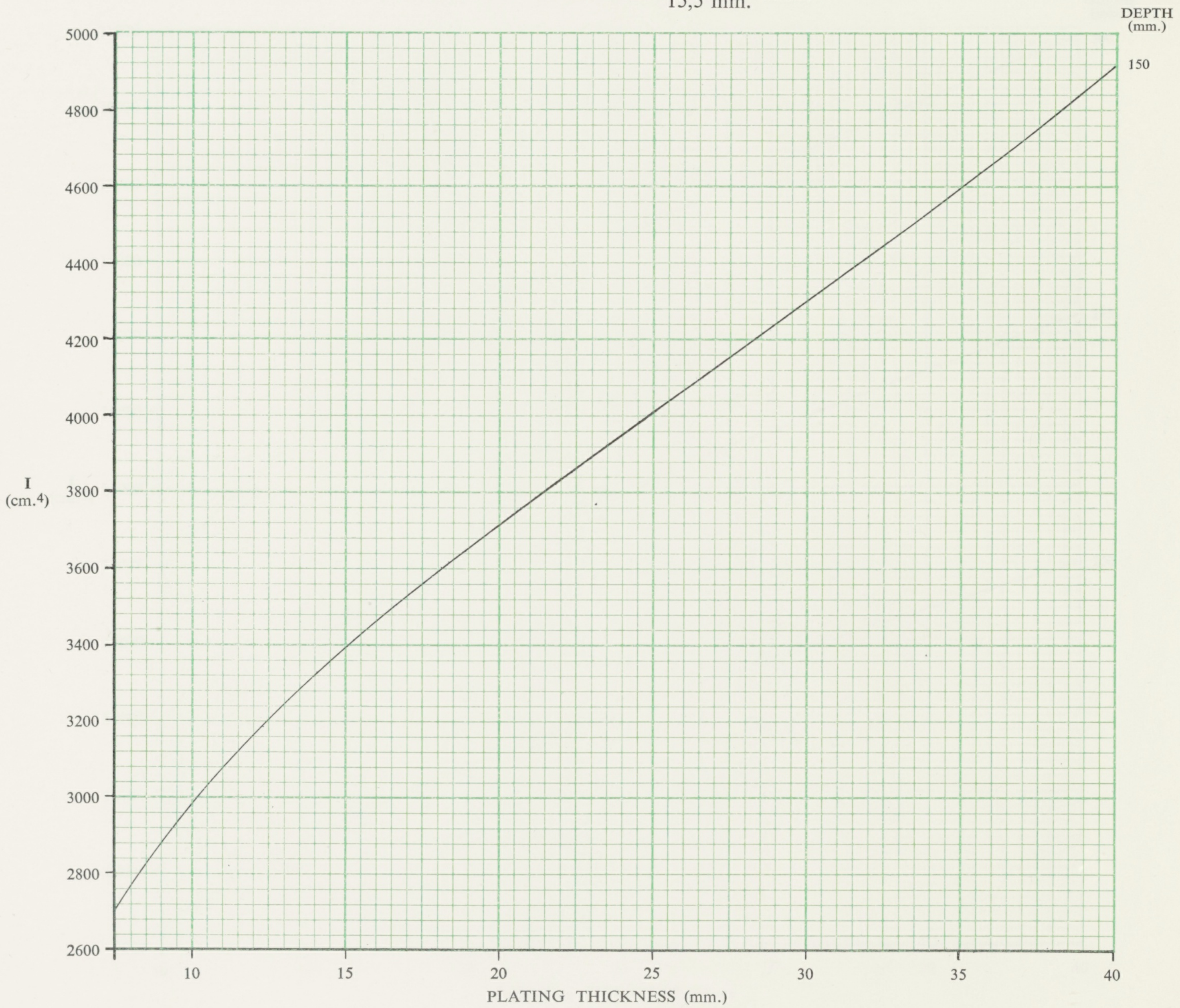


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

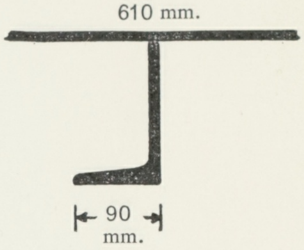


Cut from 300 mm. × 90 mm. × $\frac{10 \text{ mm.}}{15{,}5 \text{ mm.}}$ Channel

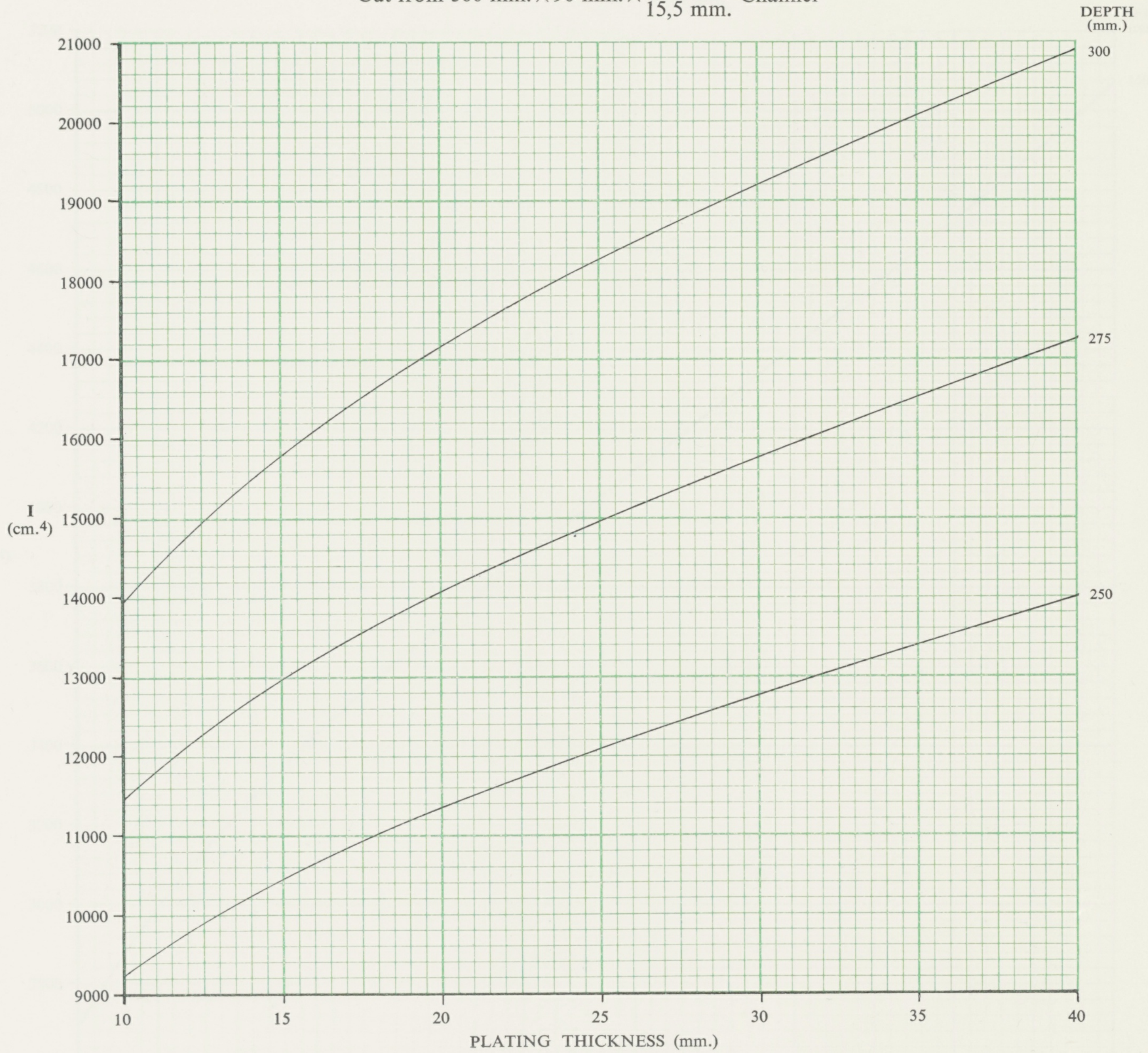


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

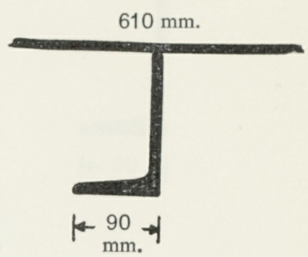


Cut from 300 mm. × 90 mm. × $\frac{10 \text{ mm.}}{15{,}5 \text{ mm.}}$ Channel

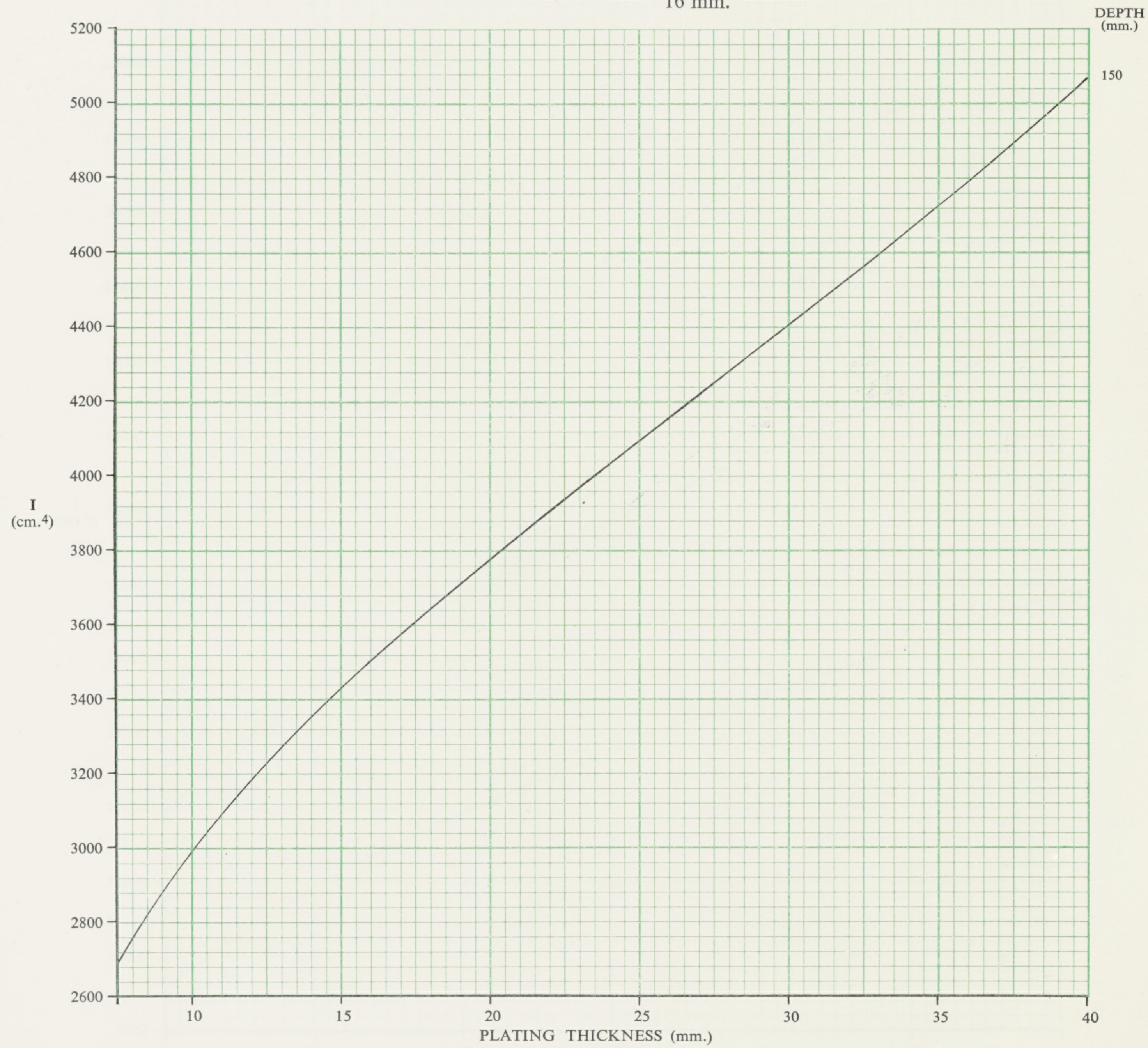


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

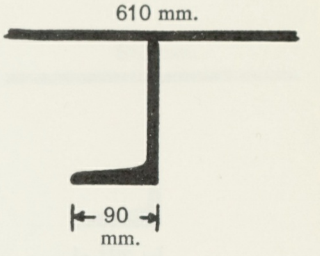


Cut from 300 mm. $\times$ 90 mm. $\times \frac{12 \text{ mm.}}{16 \text{ mm.}}$ Channel

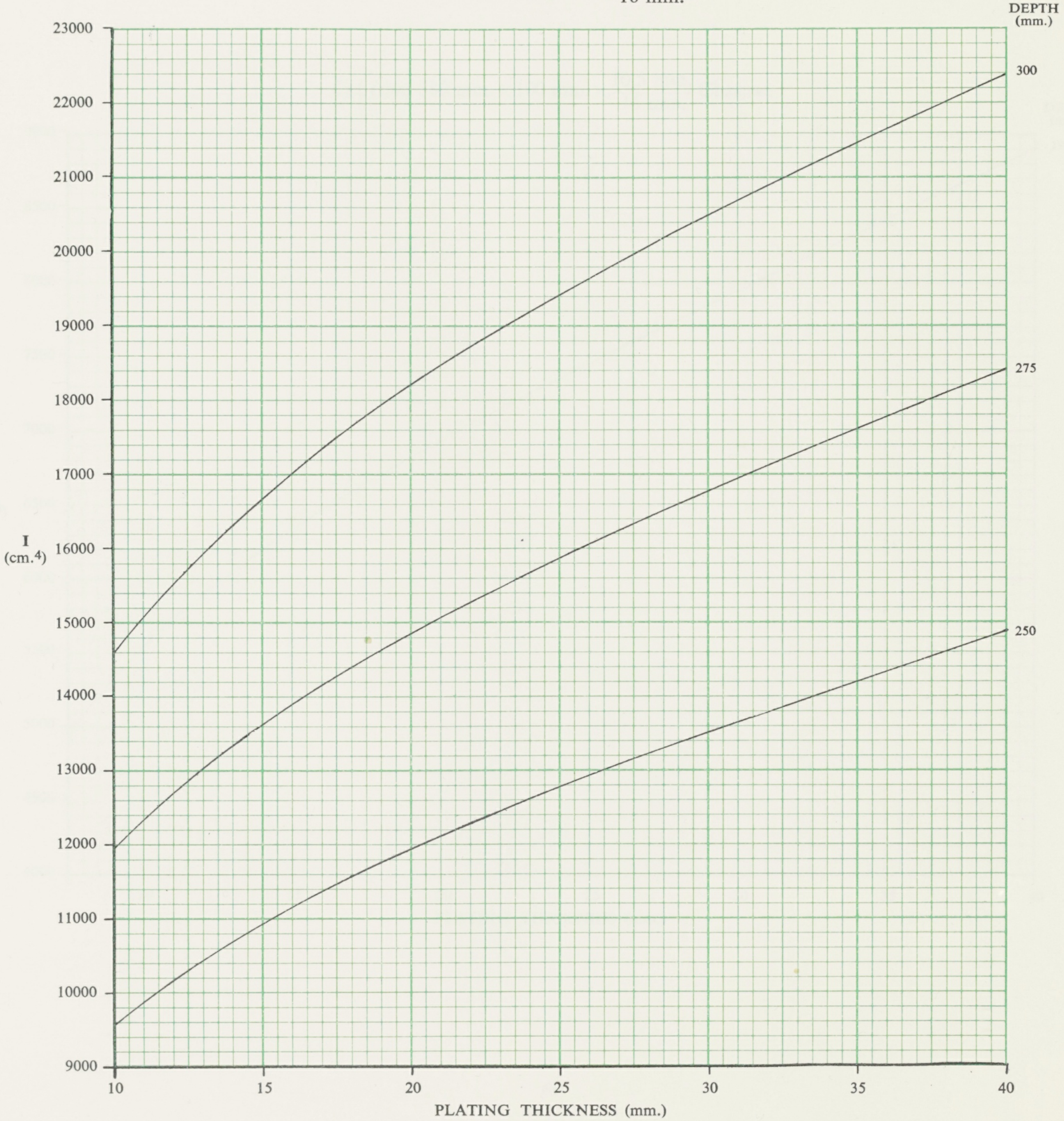


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

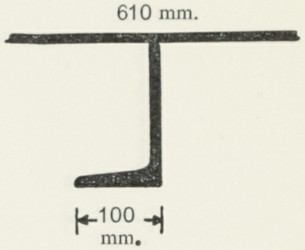


Cut from 300 mm. $\times$ 90 mm. $\times \frac{12\text{ mm.}}{16\text{ mm.}}$ Channel

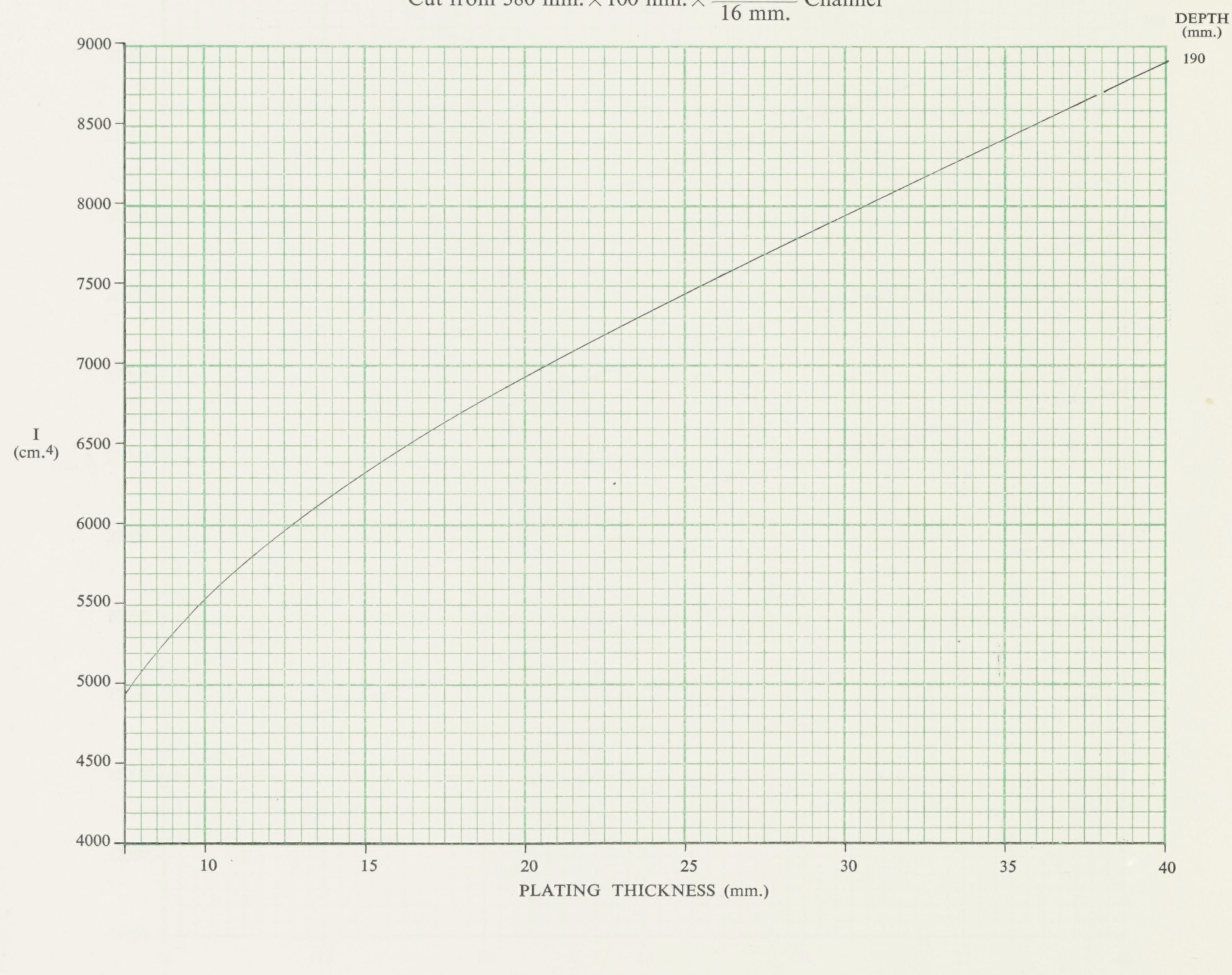


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

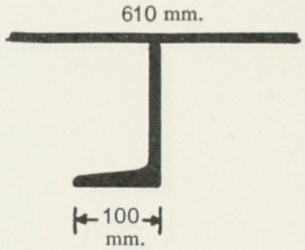


Cut from 380 mm. $\times$ 100 mm. $\times \frac{10{,}5 \text{ mm.}}{16 \text{ mm.}}$ Channel

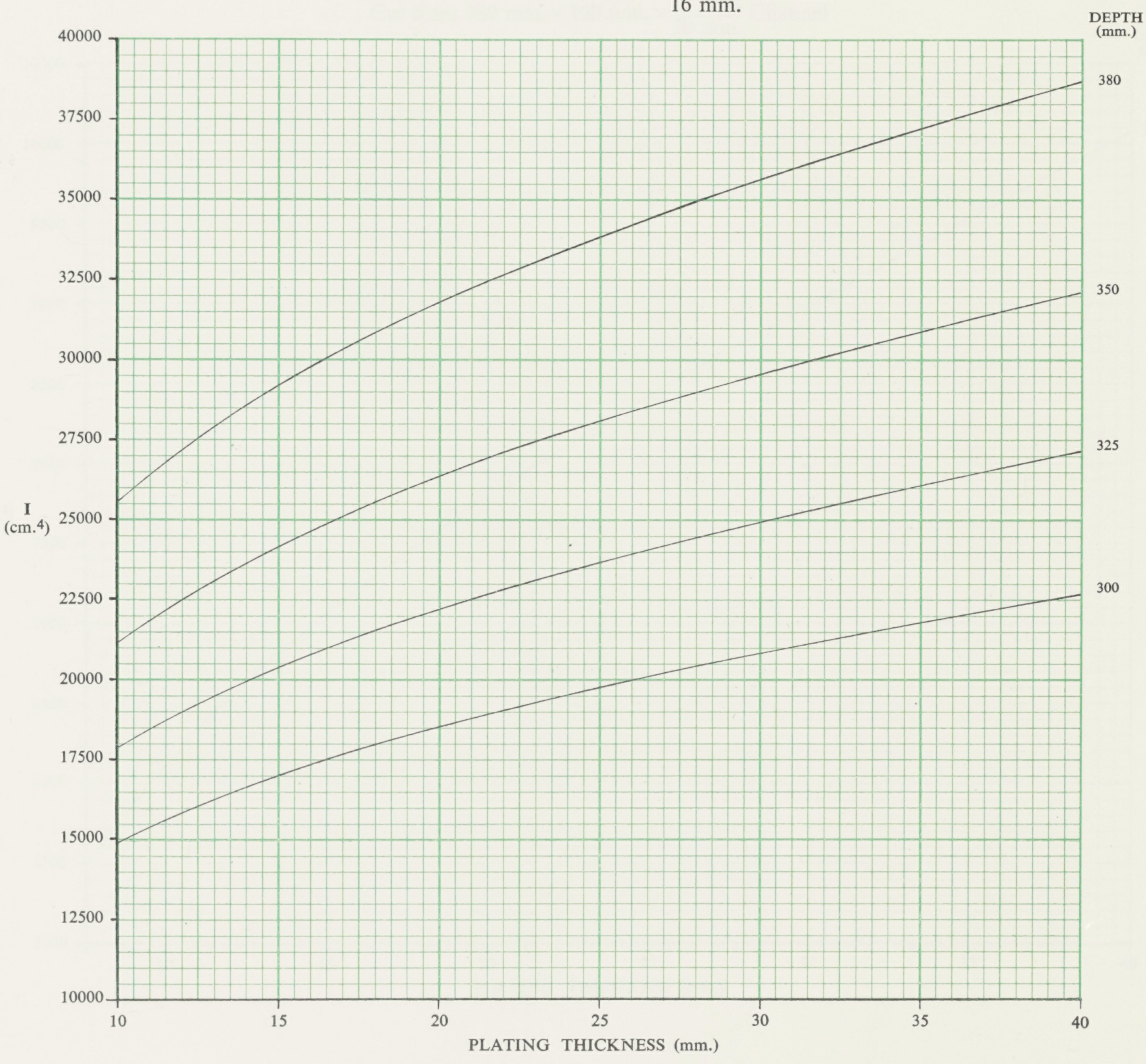


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

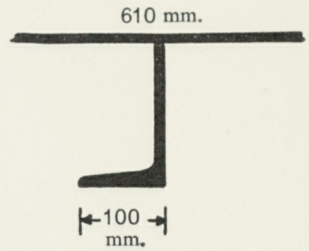


Cut from 380 mm. $\times$ 100 mm. $\times \frac{10{,}5 \text{ mm.}}{16 \text{ mm.}}$ Channel

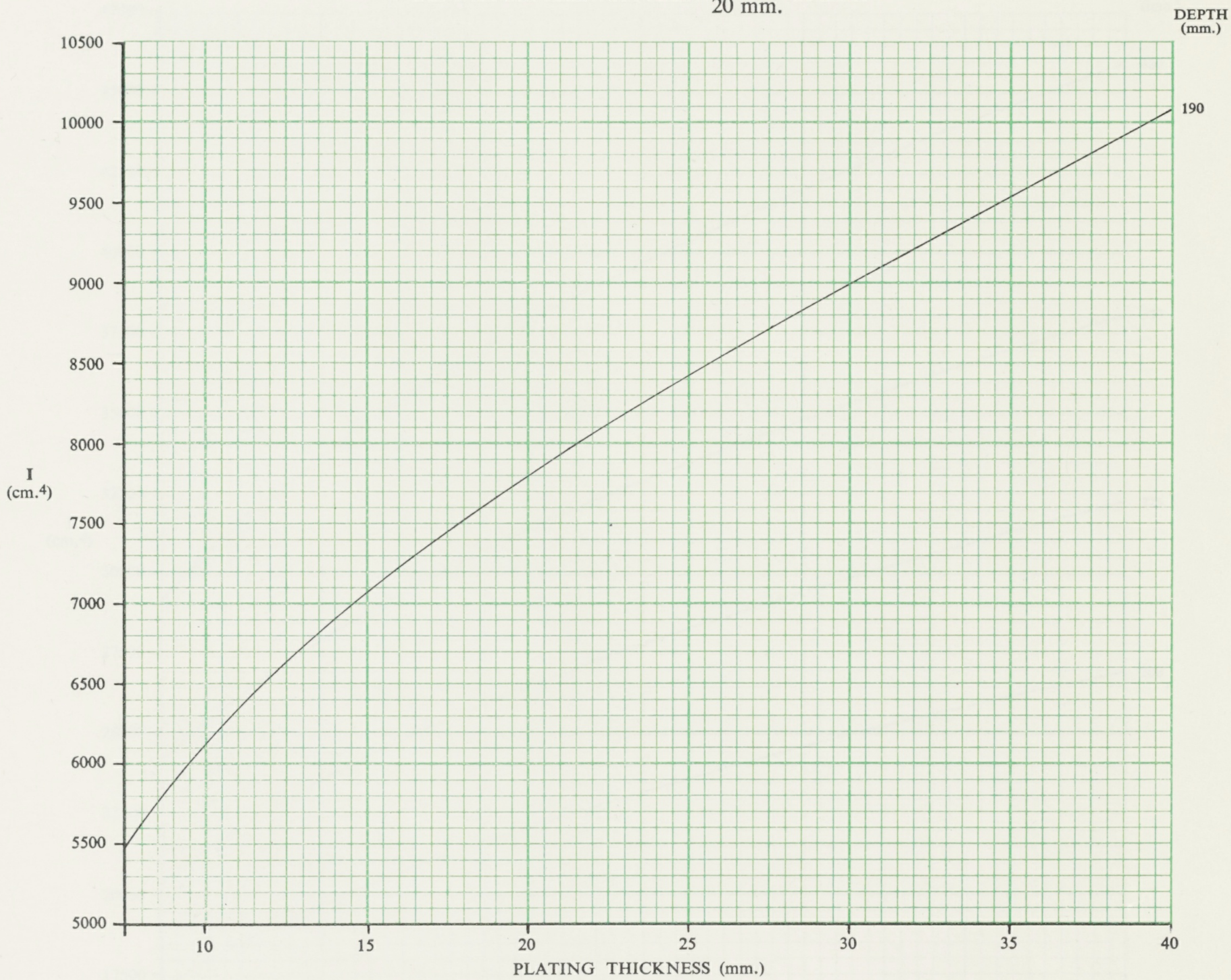


MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)



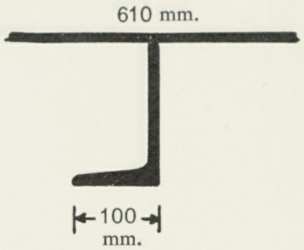
Cut from 380 mm. $\times$ 100 mm. $\times \frac{13 \text{ mm.}}{20 \text{ mm.}}$ Channel



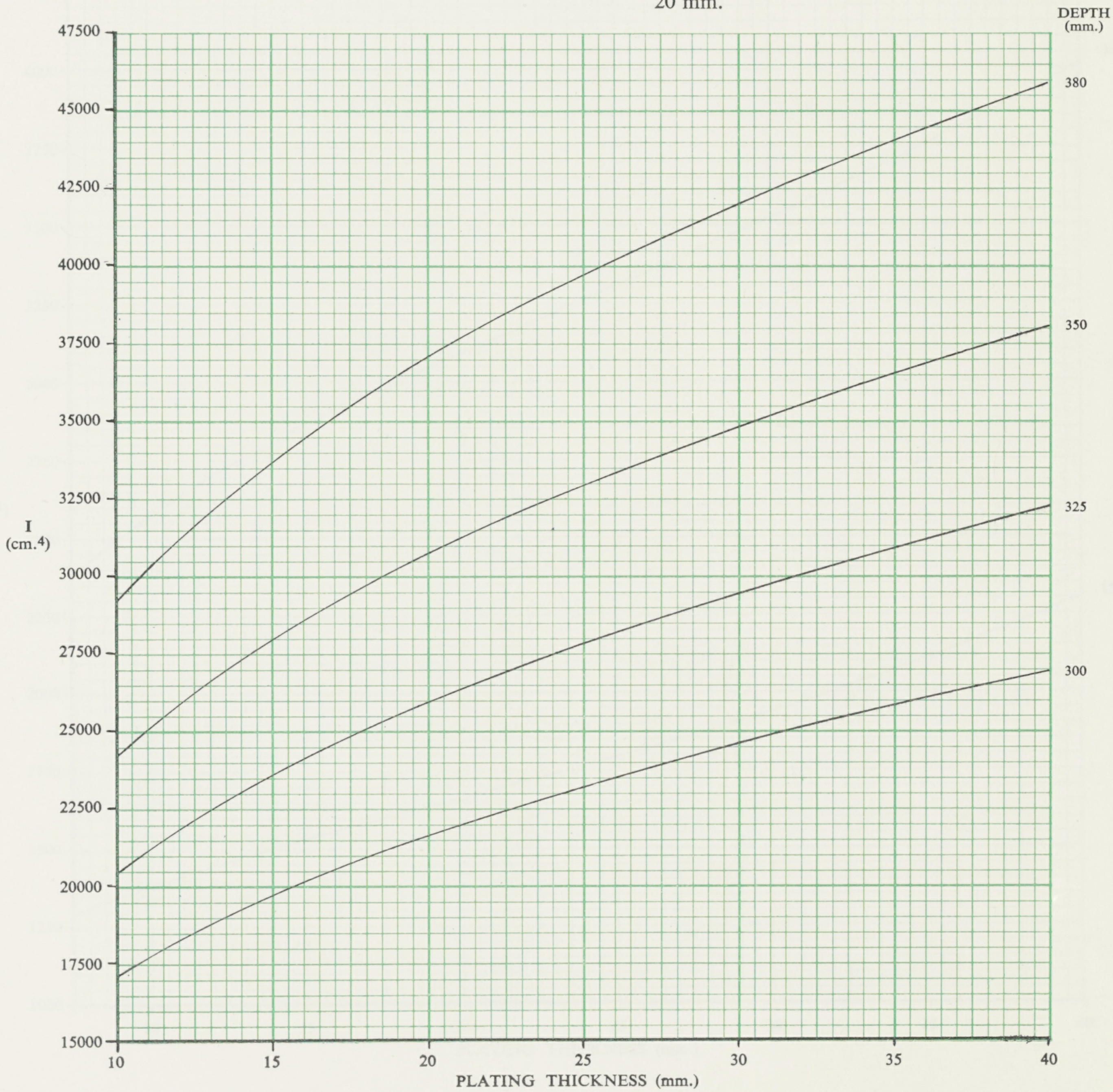
3 L

MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

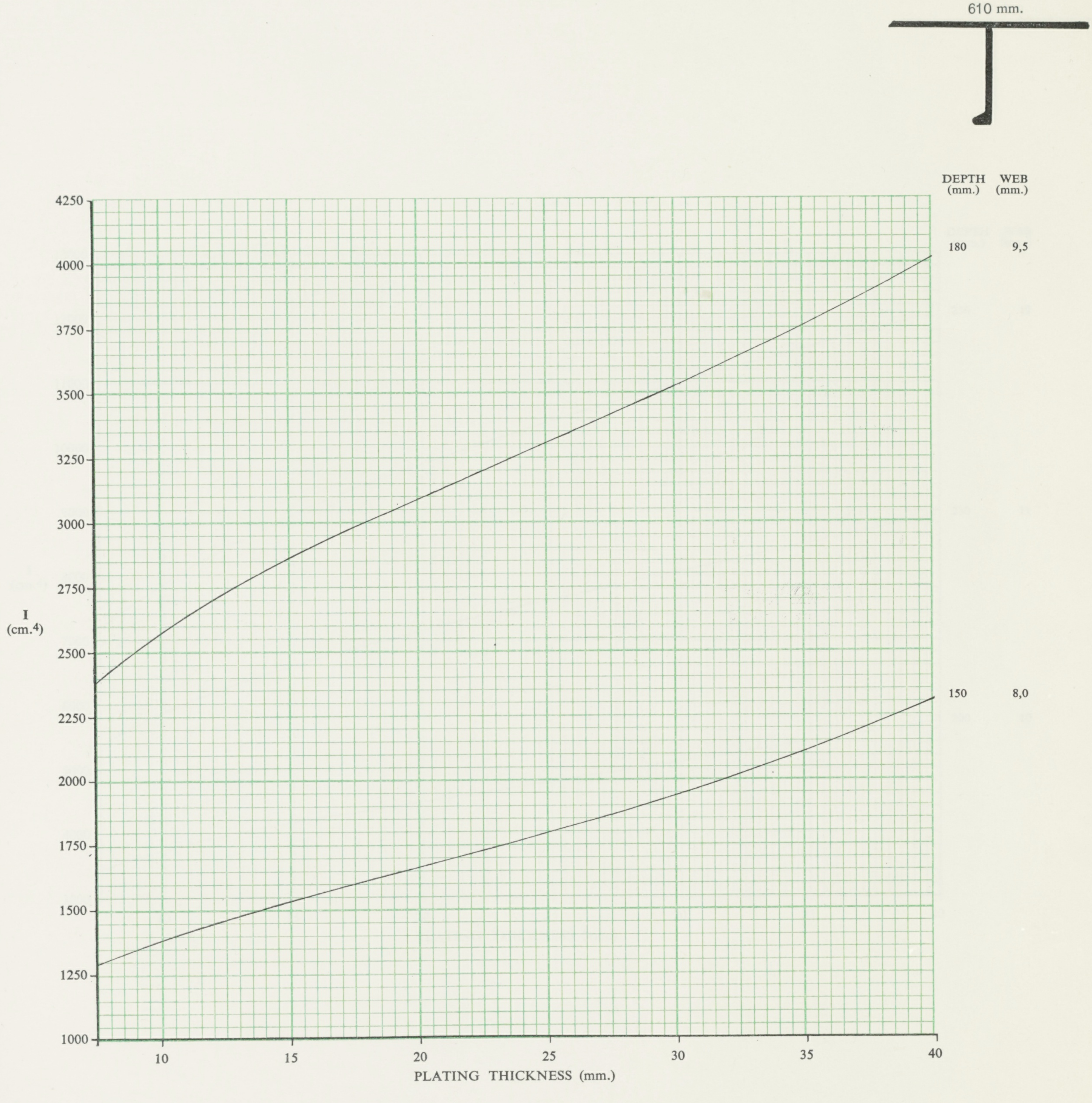


Cut from 380 mm. × 100 mm. × $\frac{13 \text{ mm.}}{20 \text{ mm.}}$ Channel



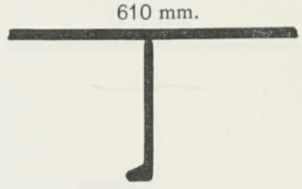
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

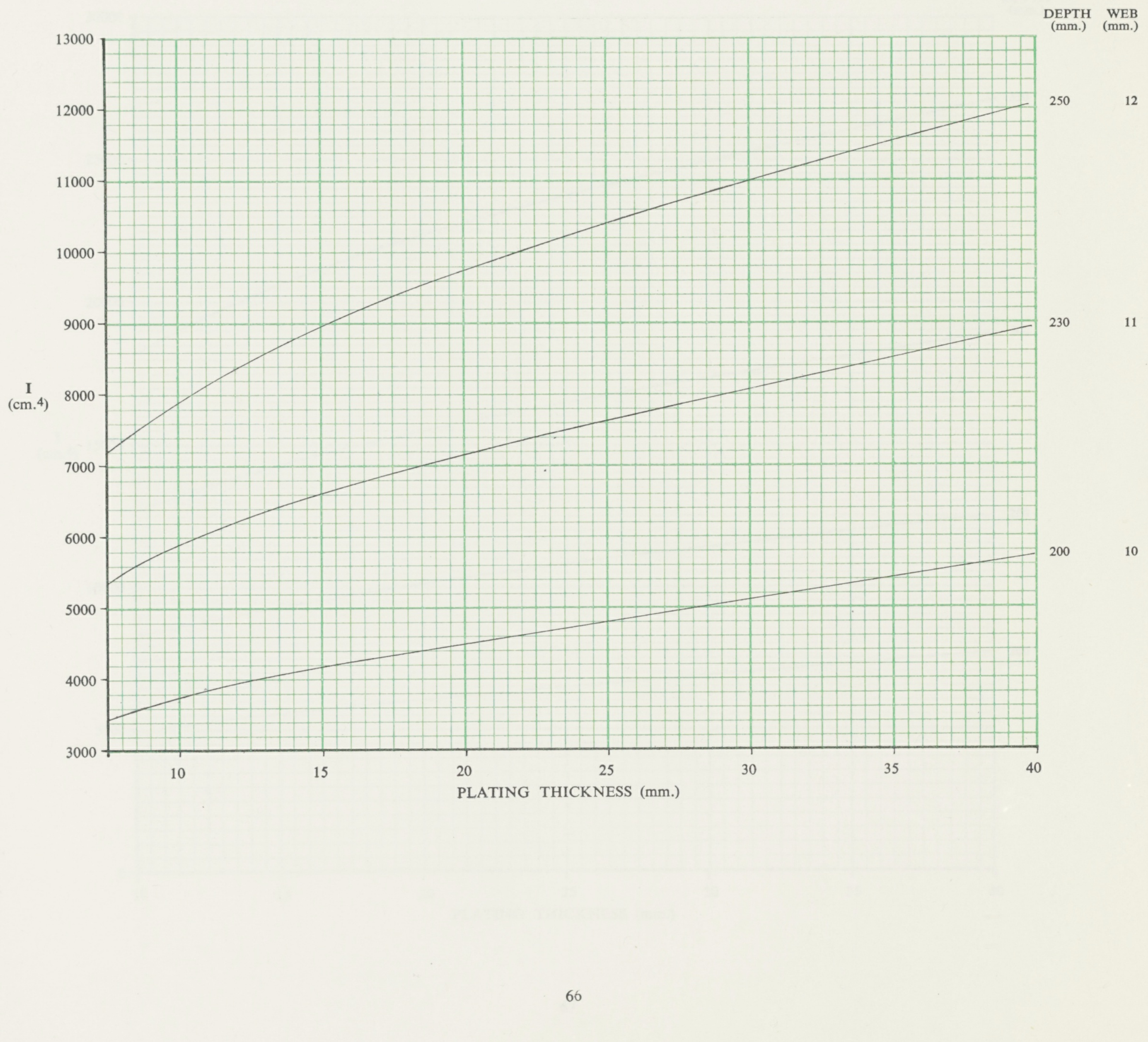
(WITH PLATING)



MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

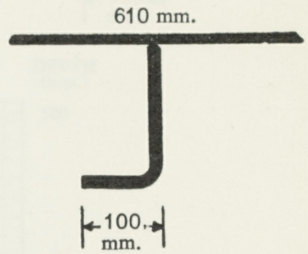
(WITH PLATING)





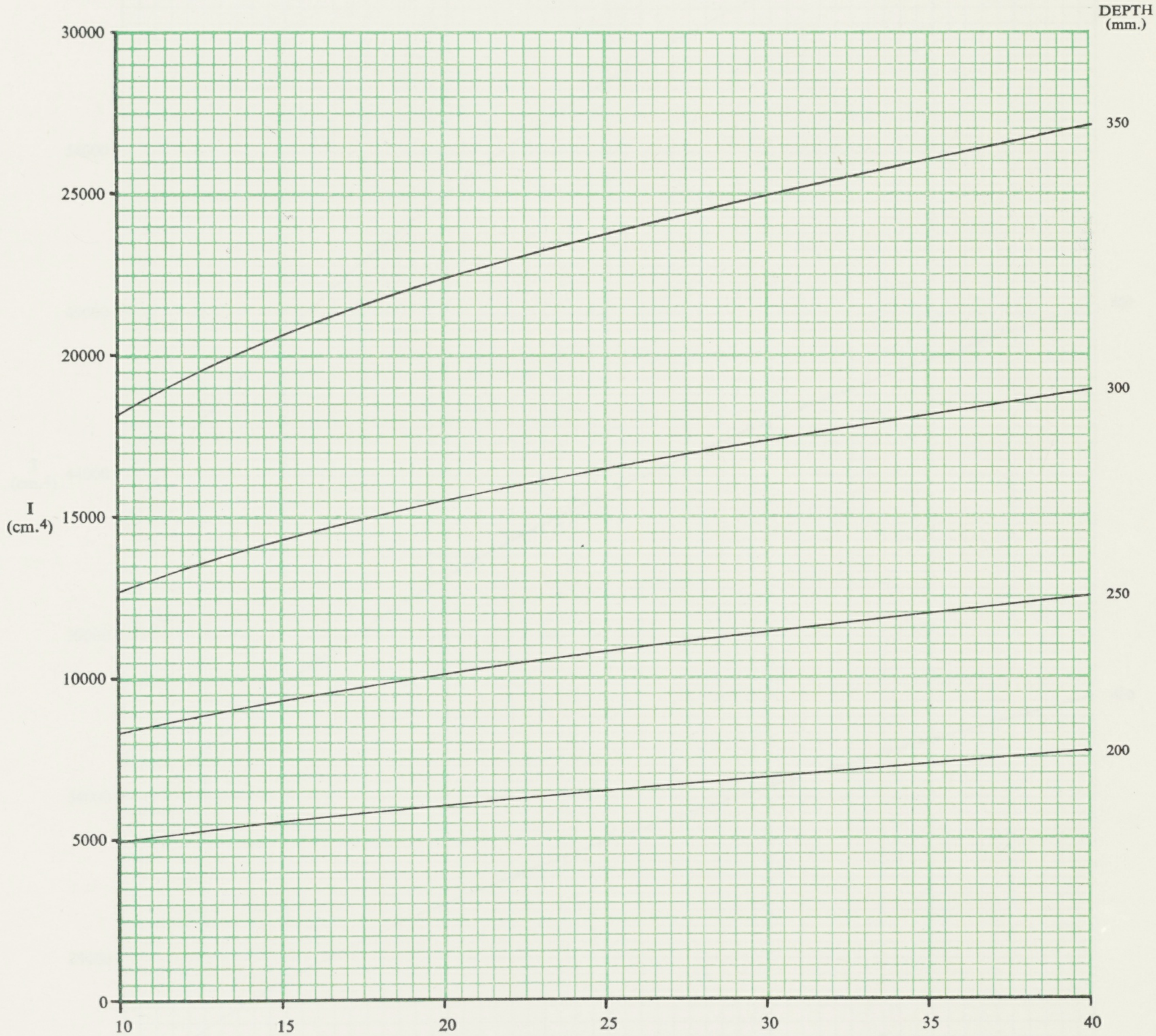
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



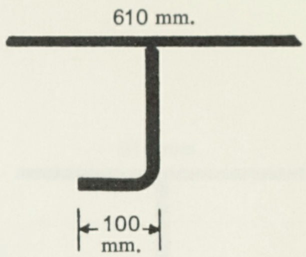
100 mm. FLANGE

11 mm. THICK



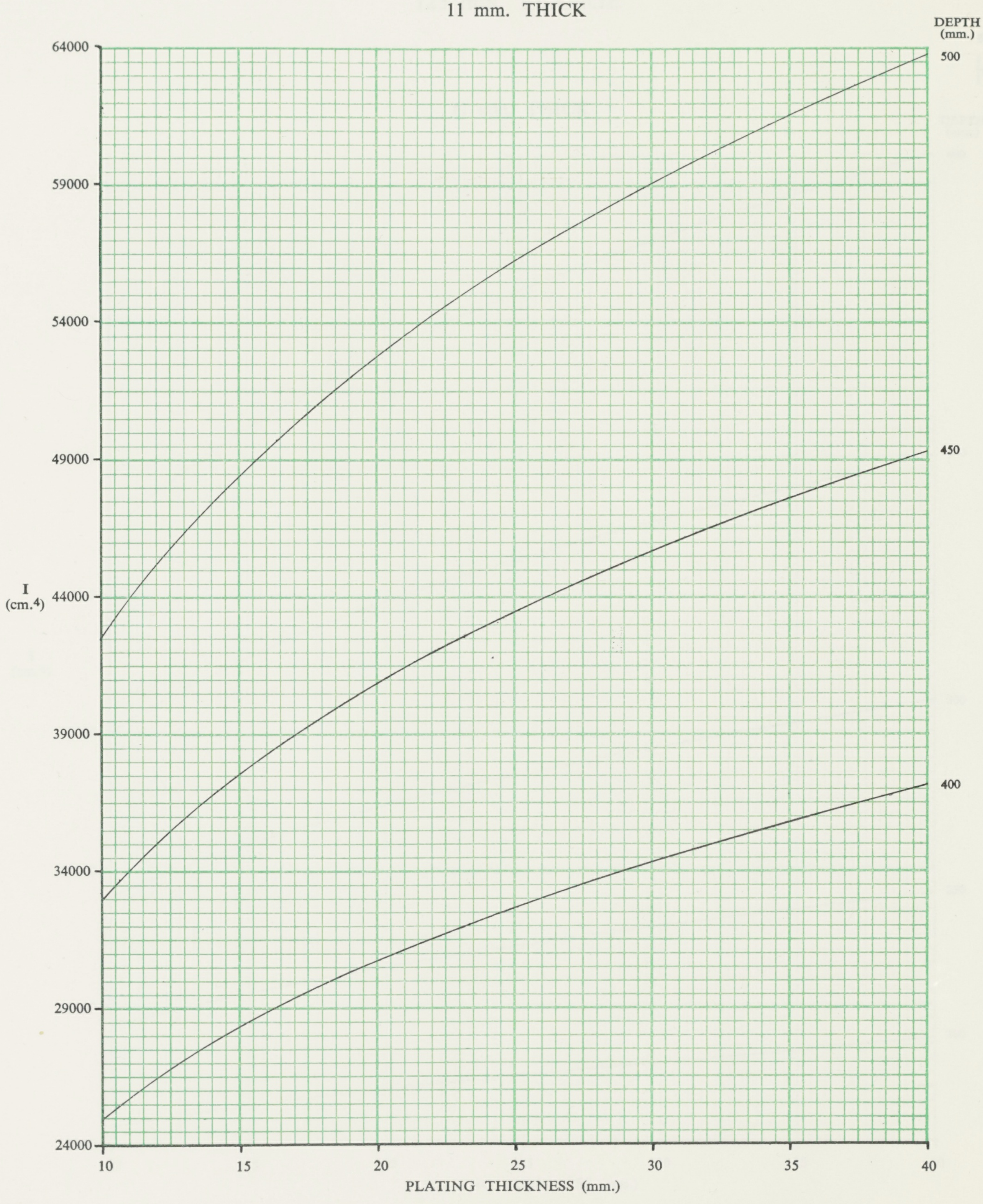
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



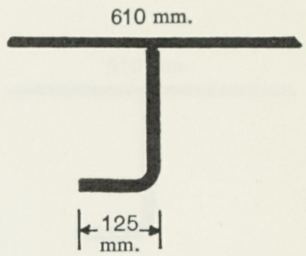
100 mm. FLANGE

11 mm. THICK



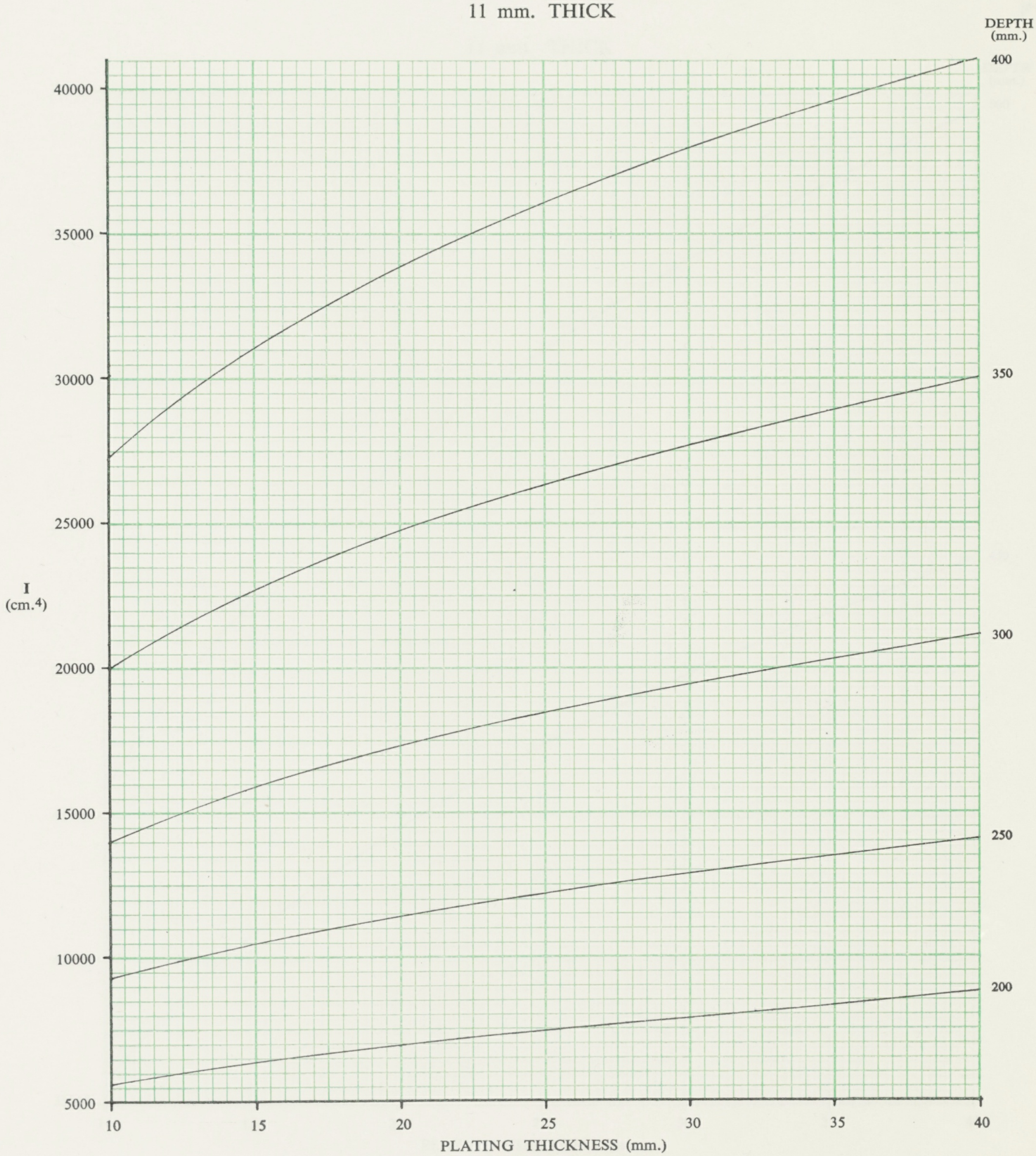
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



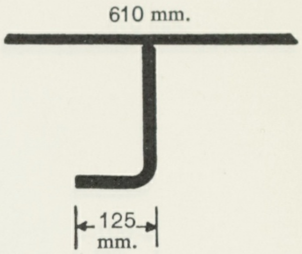
125 mm. FLANGE

11 mm. THICK



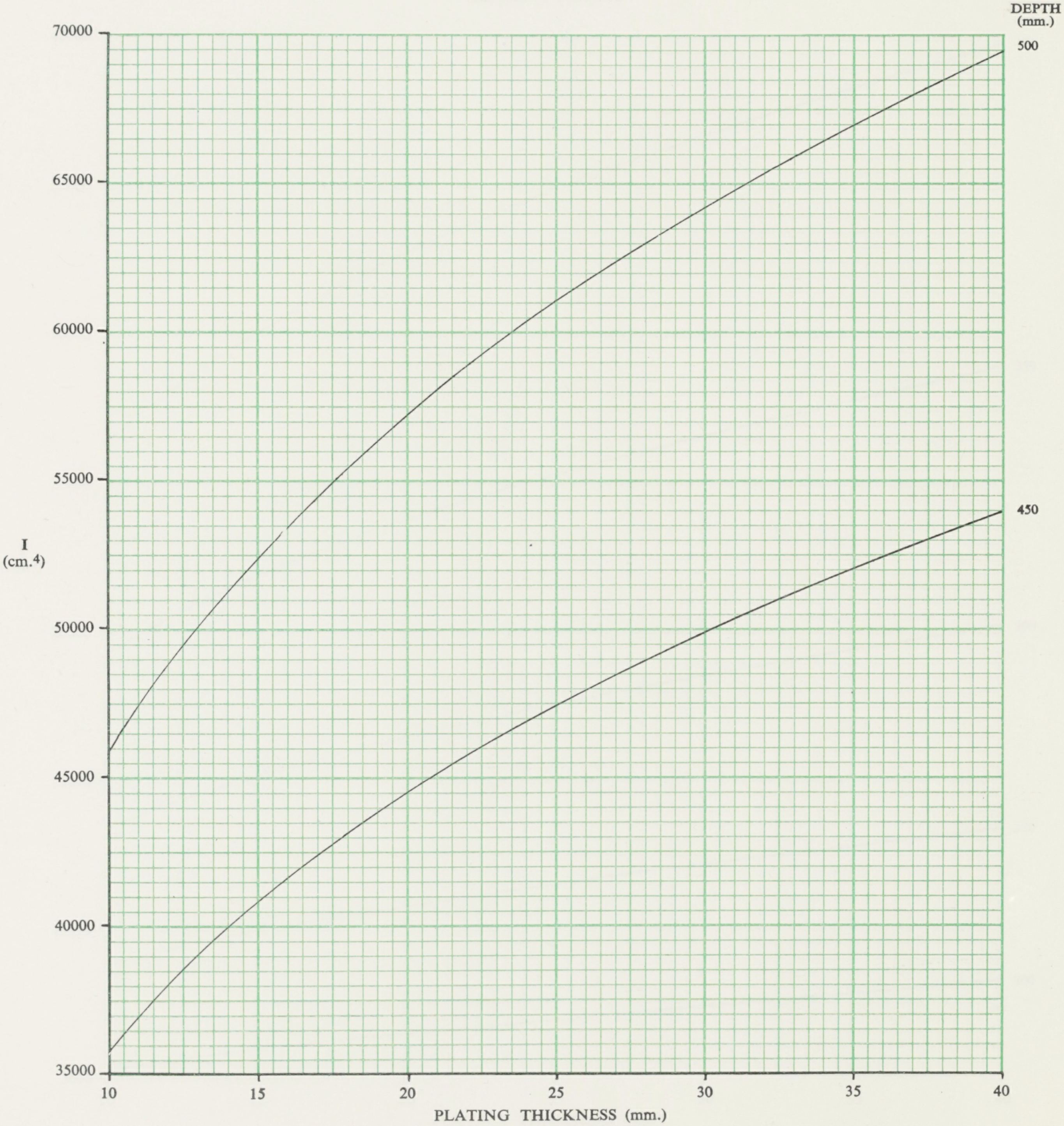
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



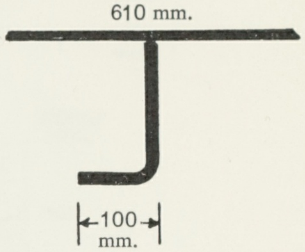
125 mm. FLANGE

11 mm. THICK



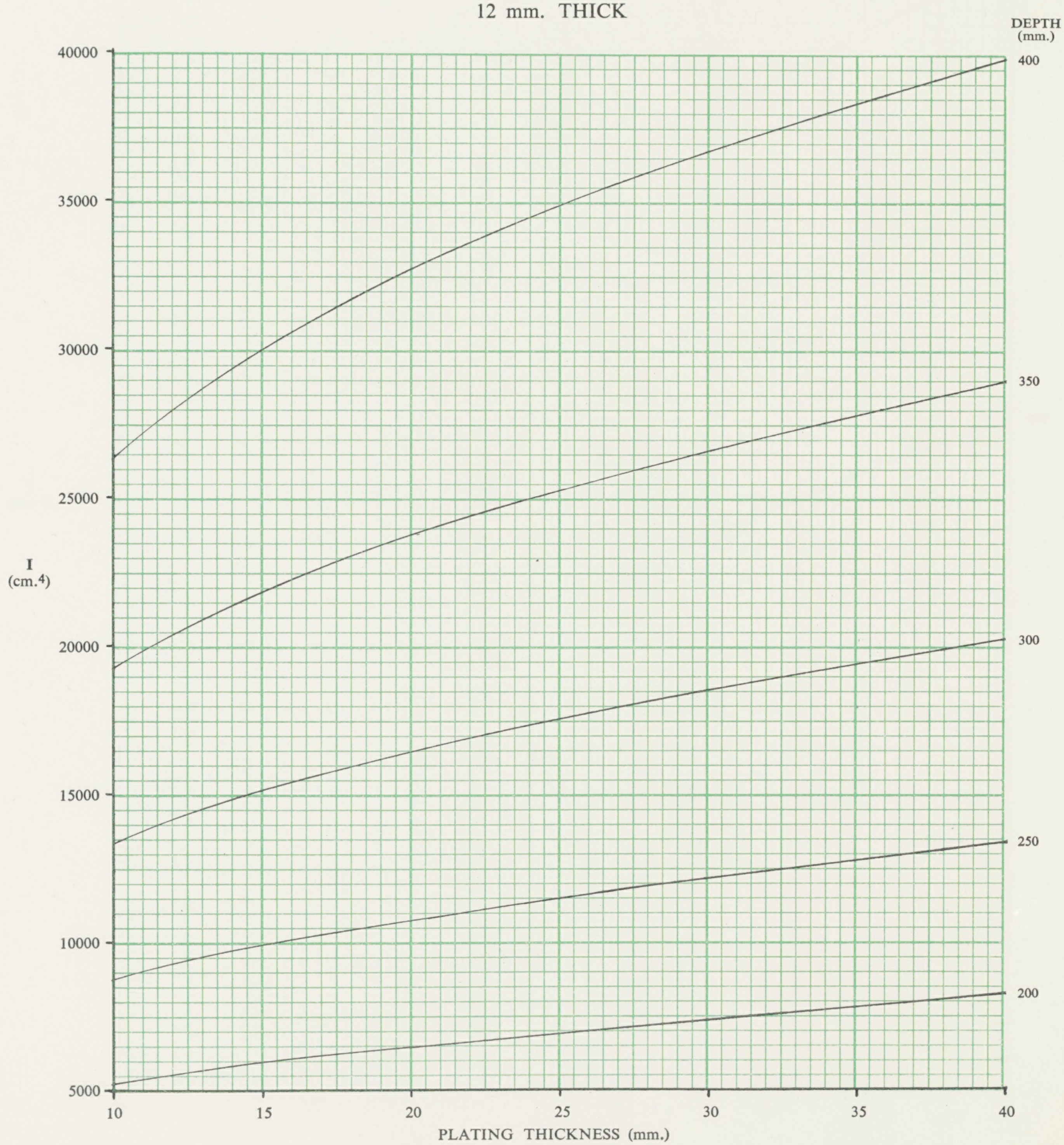
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



100 mm. FLANGE

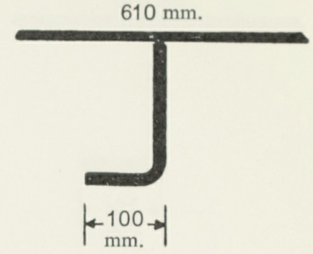
12 mm. THICK



3 M

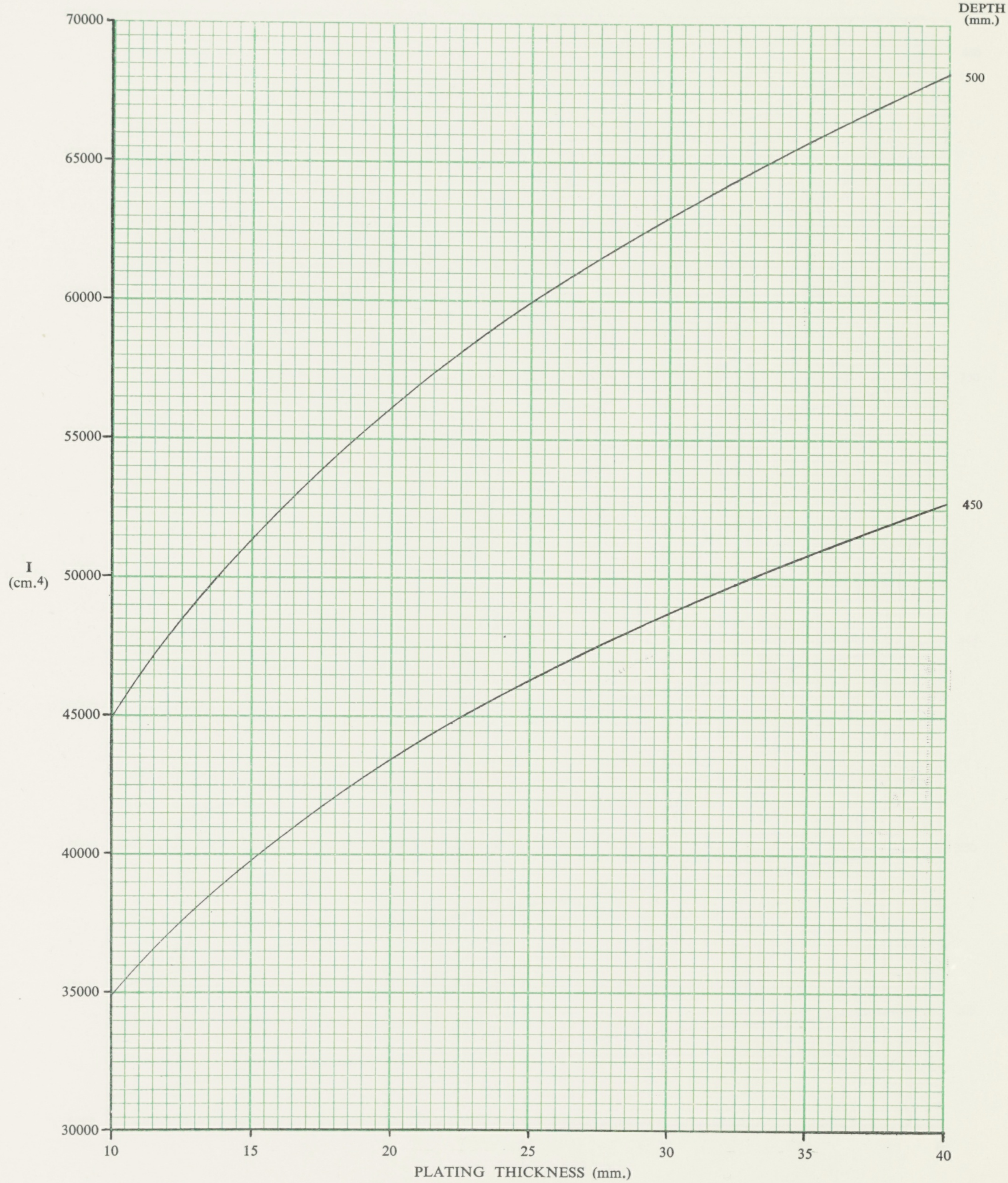
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



100 mm. FLANGE

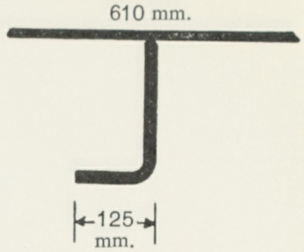
12 mm. THICK



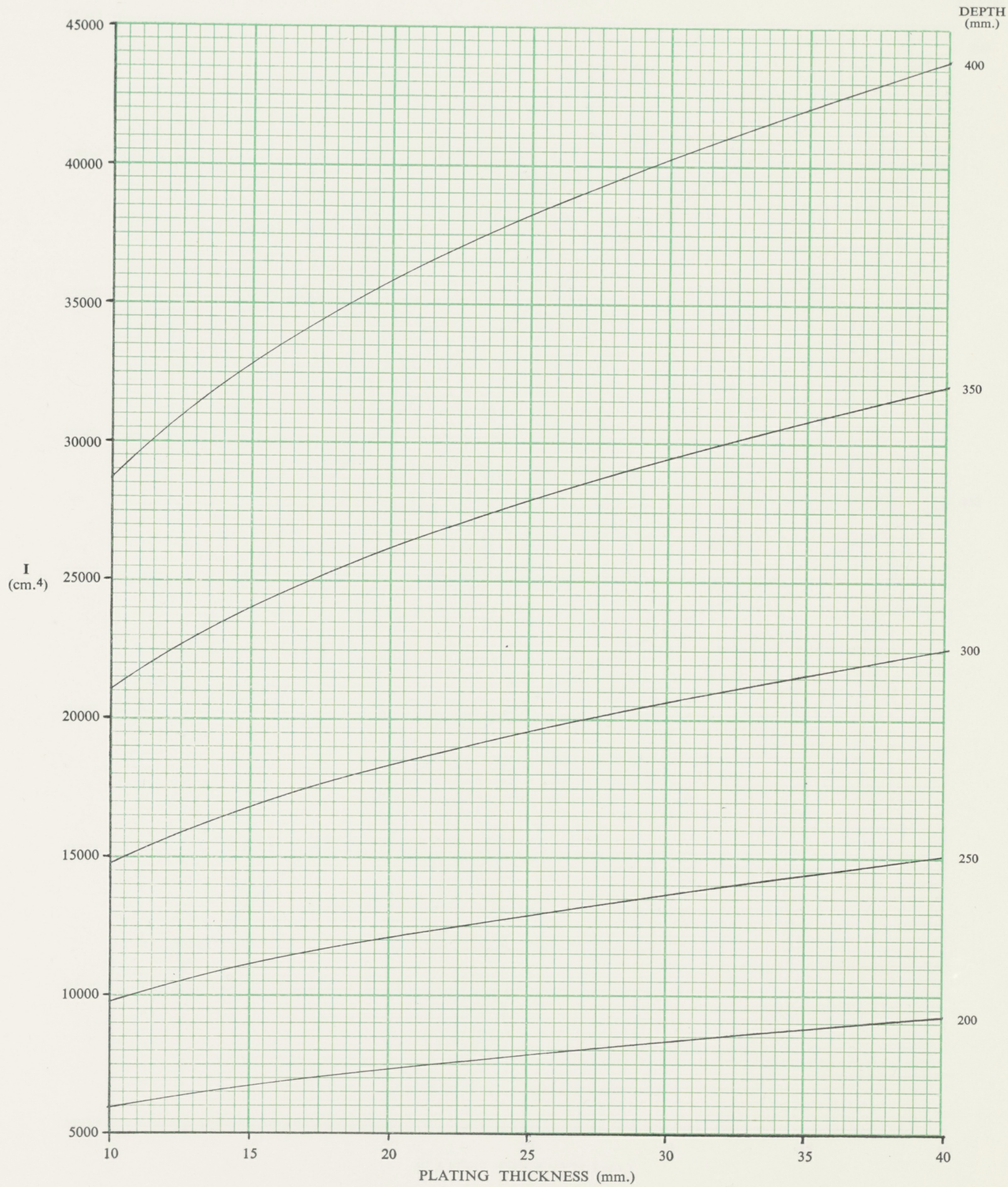
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)

125 mm. FLANGE

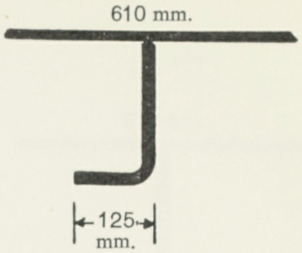


12 mm. THICK



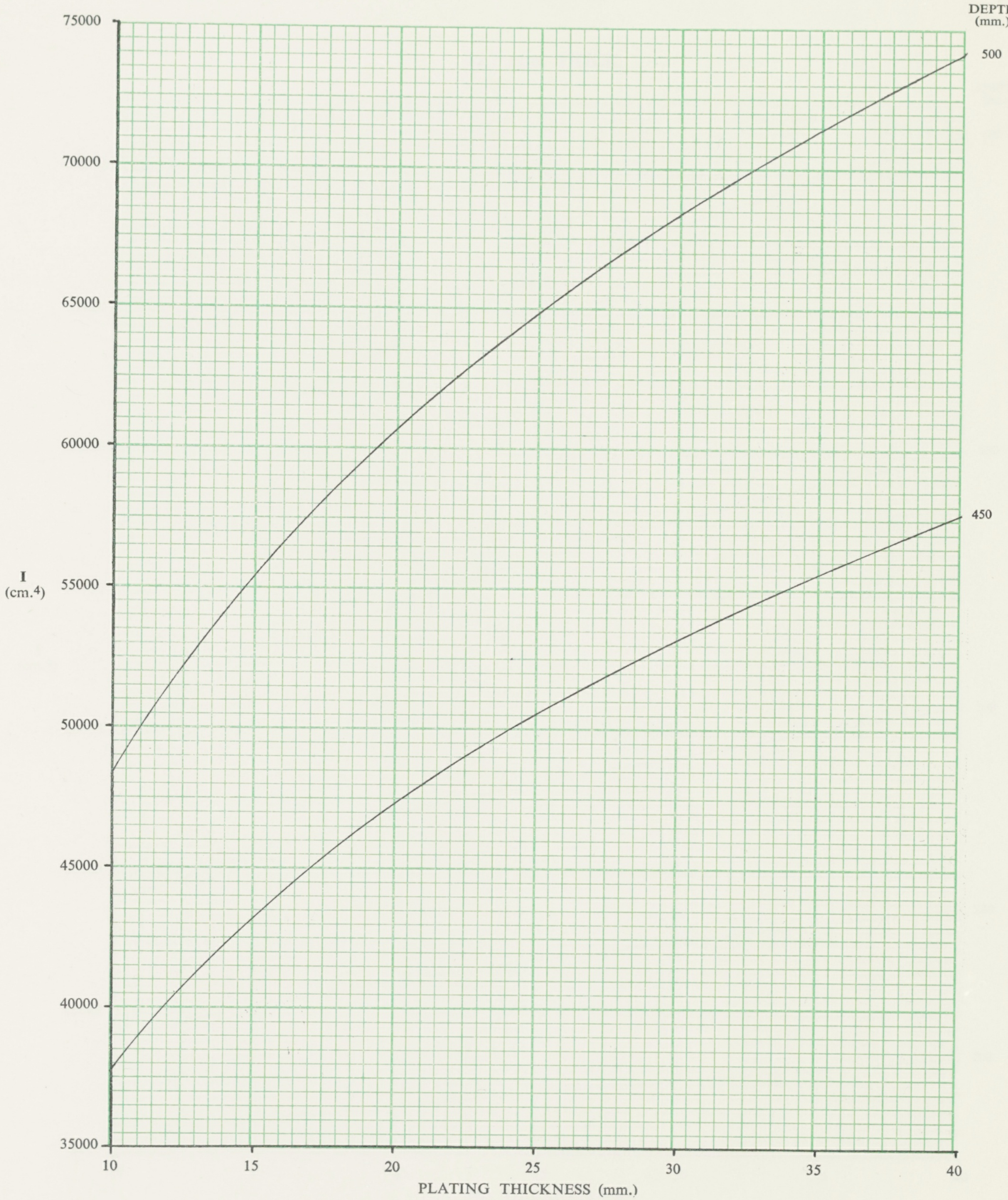
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



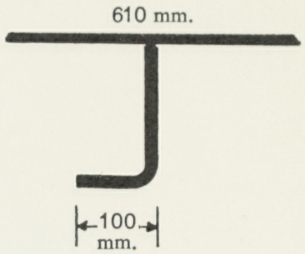
125 mm. FLANGE

12 mm. THICK



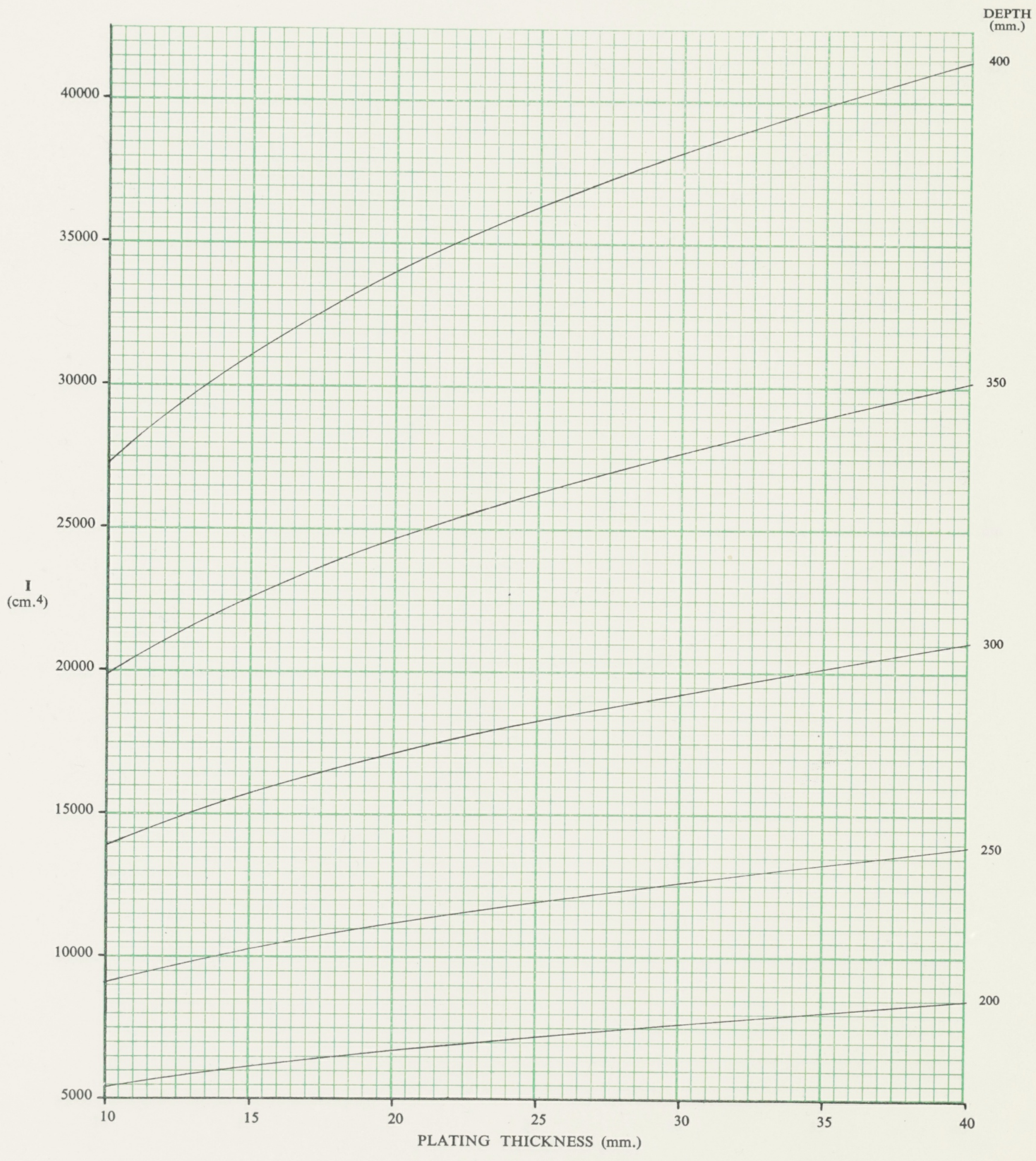
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



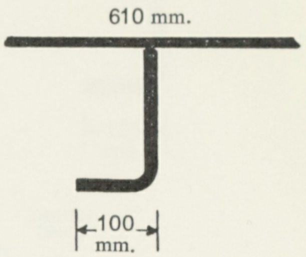
100 mm. FLANGE

12,7 mm. THICK



MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



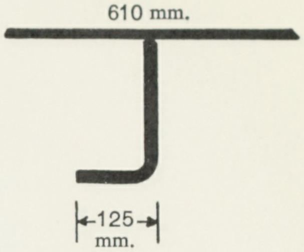
100 mm. FLANGE

12,7 mm. THICK

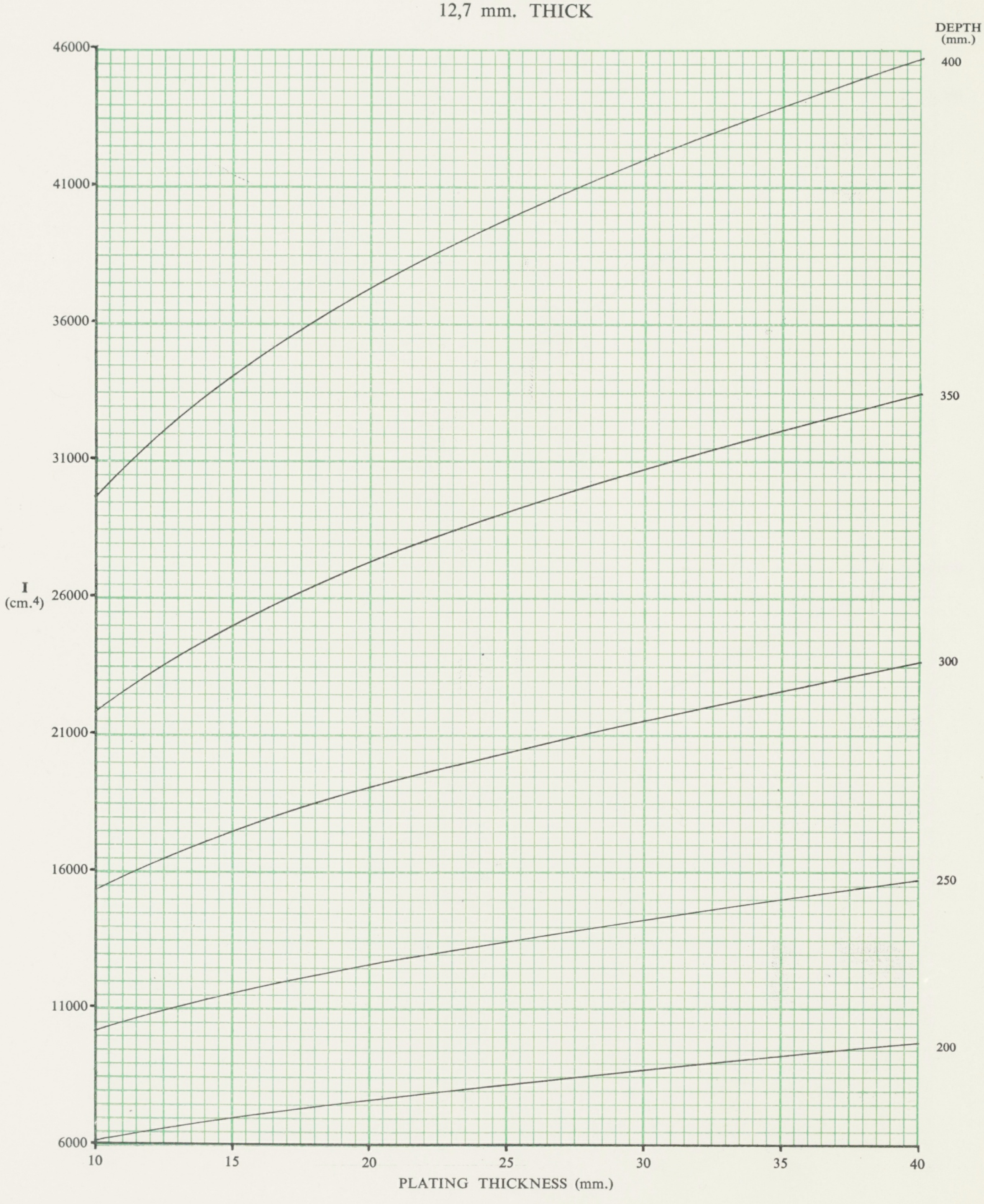
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)

125 mm. FLANGE

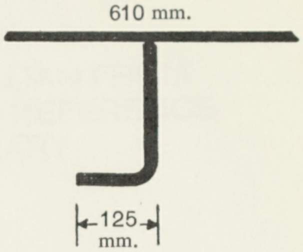


12,7 mm. THICK



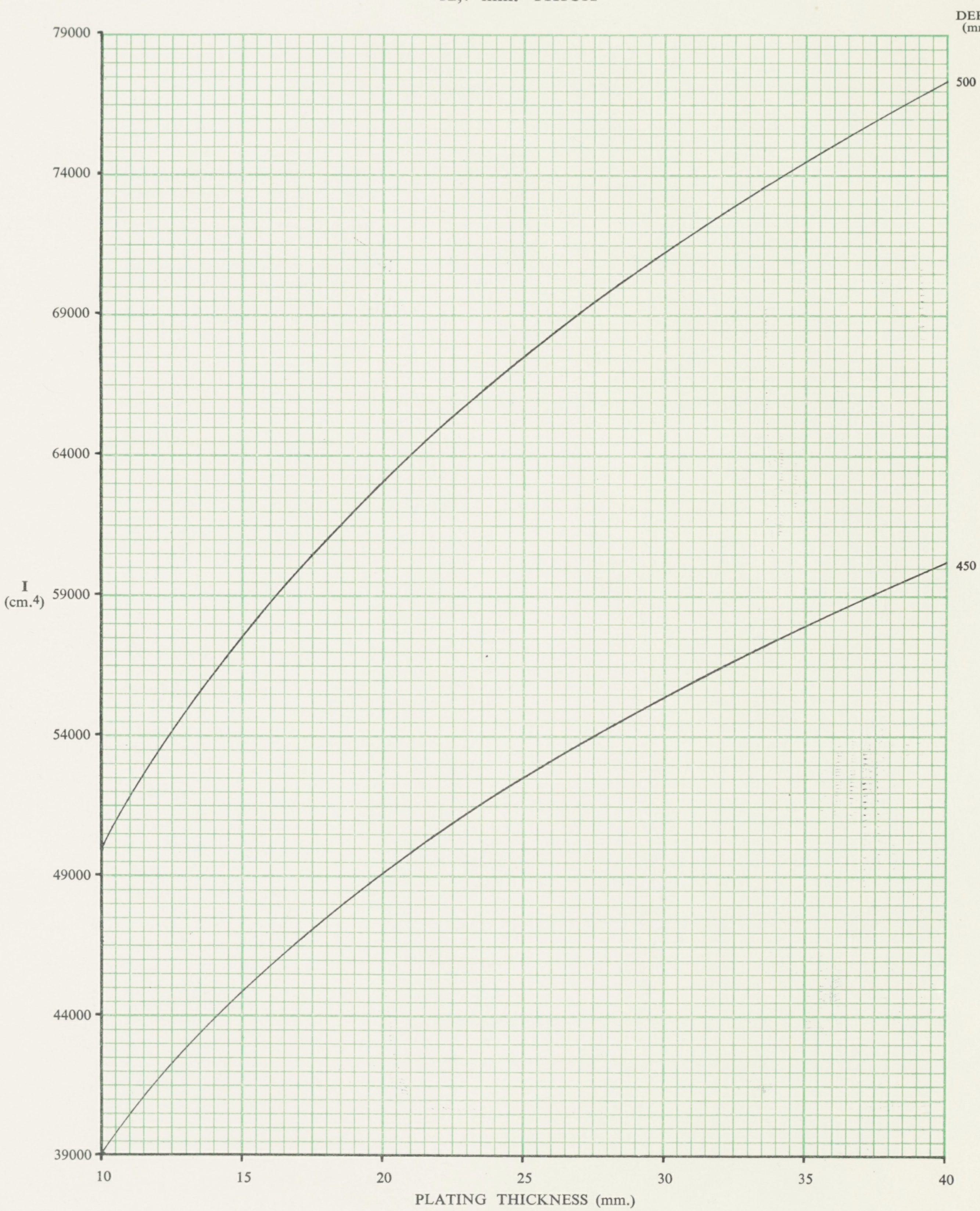
MOMENT OF INERTIA OF FLANGED PLATES

(WITH PLATING)



125 mm. FLANGE

12,7 mm. THICK



ON LOAN FROM
RDD REFERENCE
LIBRARY